PART – I

A Study on

AVURI ILAI (Indigofera tinctoria L.)

FOR AZHAL KEEL VAYU

PART – II

A Study on

UKKIRA VEERA CHENDURAM

FOR MADHUMEGAM

Dissertation

Submitted in Partial fulfillment to

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

for the award of the degree of

DOCTOR OF MEDICINE (SIDDHA)

BRANCH II GUNAPADAM

DEPARTMENT OF GUNAPADAM

GOVERNMENT SIDDHA MEDICAL COLLEGE

CHENNAI – 600 106

SEPTEMBER - 2008

BONAFIDE CERTIFICATE

Certified that this thesis titled **a study on Avuri Ilai Choornam** and **Ukkira Veera Chenduram** is the bonafide work of **Dr. Gracia Christy Priya.J.,** Reg. no: **32051602** who carried out the dissertation work under my supervision. Certified further, that to the best of my knowledge, the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Place : Chennai

Date :

Professor & Head of the
Post graduate department,
Branch II, Gunapadam,
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Chennai-600106

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ACKNOWLEDGEMENTS

At the outset, I would like to express my immense gratitude to ***Dr. Abdul Kadher, M.D. (S), Professor / Principal, Govt. Siddha Medical College, Chennai*** *for his help in completing this thesis.*

I express my heart-felt gratitude ***to Prof. Dr.M.Allimuthu, M.D. (S), Head of the Department, Gunapadam****, for his guidance and encouragement.*

My hearty thanks goes ***to Dr.V.Banumathi, M.D. (S),*** *and* ***Dr.M.Krishnaveni, M.D. (S)*** *for their guidance and valuable inputs into this study.*

I also wish to record my thanks ***to Dr.M.D.Saravana devi, M.D. (S), Dr.M.Pitchaiya Kumar, M.D.(S) and Dr.R.Karoline daisy rani, M.D.(S)*** *for their encouragement during the period of this study.*

My thanks also go to ***Dr.Sasikala Ethirajulu, M.Sc., Ph.d, CRI,*** *Chennai and* ***Dr.Menon*** *for their valuable guidance in doing the Pharmacognostic study. My sincere thanks go to* ***Mrs. Madhuram, CRI,*** *Chennai for helping me to carry out the TLC study.*

My sincere thanks go ***to Dr. Swami Nathan,*** *Arignar Anna Hospital of Indian medicine and Homeopathy for referring patients.*

I would like to thank ***Dr. Venkataraman, Ph.d,*** *Director, Research and development and* ***Mr.Thirunavukarasu,*** *C.L.Baid Metha College of pharmacy,*

Thoraipakkam for their valuable guidance in doing the pharmacological studies.

Also I wish to express my thanks to ***Mr.Madan, Mettex Laboratories,*** *Guindy for his help in biochemical analysis of the trial drugs.*

My sincere thanks go to ***Mr. Dhandapani****, Librarian and his staff, Dr.Ambethkar Library, Chennai for their co-operation in my study.*

I would like to give a special thank you to ***Dr. H.Mubarak, M.D. (S).,*** *for his support and encouragement and* ***Dr. M.Arun vanan., B.S.M.S.,*** *for his help in all my endeavours of this study.*

I cannot fully express my gratitude to ***Ms.Ilampirai, B.E., Dr. T.Hema devi, M.D. (S).,*** *and* ***Ms.P. Tamilarasi*** *for their assistance.*

I am deeply grateful to my friends who helped me in various regards in all these three years of post graduation study.

I extend my thanks to ***Mr.Ramesh*** *of Students Xerox, Neyveli house for his help in bringing out this dissertation book.*

And finally, I would be remiss if I did not mention the two extraordinary women who are a great inspiration, first my sister, ***Sophie****, my role model and the most talented woman, I have ever known and my friend* ***Cardilya,*** *whose beauty of spirit keeps me going.*

INTRODUCTION

Siddha System is one of humanity's longest and continually practiced systems of medicine. Siddha drugs are derived from natural sources such as plants, animals and minerals. Plant drugs are its mainstay. The standing instruction of Siddhars to medical practitioners is to use herbal drugs first in any ailment.

Mankind has a long history in the use of herbal medicines. The role of traditional medicine in the solution of health problems is invaluable on a global level. This is all the more striking when we consider the fact that approximately 80% of the people living in less developed countries rely exclusively on traditional medicine for their health needs. In present global scenario, natural medicines are gaining prominence, because they are economical, easily available and relatively free from side effects.

Formidable expansion of human population, hand in hand with the emergence of new mysterious human ailment have necessitated to discover hundreds of new herbals and to sustain the herbal formulation to meet the ever increasing medical care of the humanity.

Hence attention of scientists all over the world is focused towards the Indian system of medicine in the recent past. Hence it is imperative to scientifically validate our traditional claim. Scientific proof of the safety and efficacy studies with standard scientific protocols following clinical practice is the need of the hour to prove our traditional claim.

Siddha system of medicine offers cure for many diseases and helps in the management of several incurable diseases. One such disease is Azhal keel Vayu, a Vatha disease, which is a degenerative disease of the weight bearing joints. It is a disabling disease affecting mostly the elderly.

Though various herbal formulations are available for treating the disease, the search for a drug, which could be more potent and relatively produce lesser side effects continues.

Indigofera tinctoria is a well-known herb that has been evaluated for its anti-ulcer, anti-histaminic properties and various studies have been done on the plant. The efficacy of Indigofera tinctoria leaves in managing Azhal keel vayu has not been tried so far though a topical preparation of the same has been evaluated for its anti-inflammatory and analgesic properties.

Having completely convinced with the literary evidences, Avuri Ilai Choornam (Indigofera tinctoria) was chosen as the test drug to treat Azhal keel vayu. This study will enable to prove the efficacy of Avuri Ilai Choornam as an analgesic and anti- inflammatory drug.

AIM AND OBJECTIVES

Aim:

To evaluate the efficacy of AVURI ILAI CHOORNAM in the management of Azhal keel vayu.

Objectives:

- To collect and study relevant literary evidence
- To identify the drug that is to be used in the study
- To subject the drug to Pharmacognostic study
- To subject the trial drug to a detailed bio-chemical analysis
- To subject the drug to microbiological analysis
- To subject the drug to pharmacological and acute toxicity studies
- To identify and induct suitable patients for the study
- To administer the drug and continue the treatment for the required time
- To collect all the relevant data to ascertain the effects of the drug

REVIEW OF SIDDHA LITERATURE

In several Siddha books, Avuri is often mentioned by its other names. The synonyms of Avuri are given below.

÷ÁÖ ö£¯ºPÒ:

In his book Bogar Nigandu 1200, Bogar quotes,

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- ußø© & öÁ¨£®
- ¤¶Ä & Põº¨¦

ö\´øP:

- ~m¦¬UöPõÀ¼ & Germicide
- ¬øÓöÁ¨£PØÔ & Antiperiodic
- öÁ¨£¬shõUQ & Stimulant
- ÃUP[Pøµa] & Deobstruent
- xÁº¨¤ & Astringent

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One of the diseases mentioned above includes Keel Vayu. Azhal Keel Vayu, a subtype of Keel Vayu, was chosen to be treated with Avuri ilai Choornam.

ÁÇUS:

- AÄ¶°ø», AÄ¶÷Áº¨£møh, ö£õ¶zu ö£¸[Põ¯®, ªÍS, CøÁPøÍ Köµøh yUQ, {ßÓõP Aøµzx, _søh¯ÍÄ ö\´x {õÒ JßÖUS Põø» JßÖ ©õø» JßÓõPU öPõkzx E¨¤À»õ¨ £zv¯® øÁUP, {µ®¦]»¢v Sn©õS®. Cøu÷¯ Aøµzx {µ®¦a]»¢v ÷uõßÔÂhzvÀ øÁzxU Pmh»õ®.

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- AÄ¶°ø»a \õØÔøÚ £õsk, Põ©õø», Pµ¨£õß ÷{õ°À øP¯õÍ {À» £»ÝshõS®.

The leaves of Avuri are indicated for Keel Vayu in books other than PorutPanbu Nool. They are given below.

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¬v¯õºT¢uÀ, AÄ¶, S¸¢x, Bhõ÷uõøh, yxøÍ, \õµøn, ö{õa], ¬¸[øP, öÁÒ÷Á»®£møh, öPõi÷Á¼, ÷Áº ÁøPUS J¸ ÁµõPß Gkzx Cizx, uspº Âmk {ßÓõP Aøµzx ÷Á¨ö£søn²hß (1¼ ÷\º) SÇ¨¤ Ak¨¤ß ÷©÷»ØÔ G¶zx £uzvÀ CÓUQ ÁiPmi, Põö\øh AÍÄ vÚ¢÷uõÖ® EmöPõÒÍ SvøµÁ¼¨¦, Áõu® w¸®. Buõµ® : APìv¯º 2000, £UP® 212

There are several preparations in which Avuri leaf (Indigofera tinctoria) is one of the ingredients. Few are mentioned here.

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REVIEW OF LITERATURE

BOTANICAL ASPECT

Indigofera tinctoria L.

Synonyms[29] :

Tamil	:	Avuri, Neeli
English	:	Common Indigo
Hindi	:	Nili, Lil
Sanskrit	:	Nilika, Nilini, Rangapatri
Malayalam	:	Neelamar, Amari
Telugu	:	Nilichettu, Nili
Urdu	:	Nila
Chinese	:	Hsiao Ching, Monlan

Bentham and Hooker's classification of Indigofera tinctoria:

Kingdom	:	Plant Kingdom
Division	:	Phanerogam
Sub-Division	:	Angiosperms
Class	:	Dicotyledons
Sub-Class	:	Polypetalae
Series	:	Calyciflorae
Family	:	Leguminosae
Sub-family	:	Fabaceae
Genus	:	Indigofera
Species	:	tinctoria

Plant description[24] :

- Erect shrub : Branches terete or more or less angular. Slightly silvery from fine appressed hairs.
- Flowers : Numerous, of a pink or purple rose colour in axillary racemes.

  Calyx 5- cleft, gamosepalous, hairy outside; teeth triangular, acute, as long as the tube.

  Corolla – Papilionaceous; long, standard pubescent at the back.

  Stamens – 10, diadelphous

  Ovary – sessile with a short, incurved style ending in a capitate stigma.
- Leaves : Alternate, 3-4 inches long; shortly stalked, unequally pinnate with small setaceous stipules, rachis – stiff, tapering, hairy leaflets in 4-6 opposite pairs and an odd one, very shortly stalked, each with a minute stipella at the base, oval or obovate – oblong, glabrous and bluish green above, silky with white adpressed hairs and paler beneath.
- Pods : Long – linear, straight or slightly curved, apiculate, thickened at the sutures, glabrous.
- Seeds : Truncated at both ends; rhombic in Cross – section. Seedling with epigeal germination; cotyledons thick, short- lasting

Distribution : Widely cultivated in many parts of India.

Taste **:** The leaves have a bitter taste.

Constituents[41] :

- Indican, the oxidised form of Luc-indigo or Indigo white.
- Indigotin or Indigo-blue
- Indigo-red, Iso indigotin, a bisindole derivative which is responsible for its anti-leukemic activity.
- A galactomannan, composed of galactose and mannose in molar ratio of 1:1,52
- Phenols
- Anti-radicals that show very strong free radical scavenging activity.
- Indirubin, a bis-indole isomer of indigo, which has anti-tumour properties.

Total flavanoids are maximum in leaf and minimum in roots. They are :

- Apigenin
- Kaempferol
- Tuteolin
- Rotenoids
- Luvsollin
- Quarcetin

The leaves of Indigofera tinctoria contain per 100 g dry matter approximately[27].

N 5.1g

P 0.35g

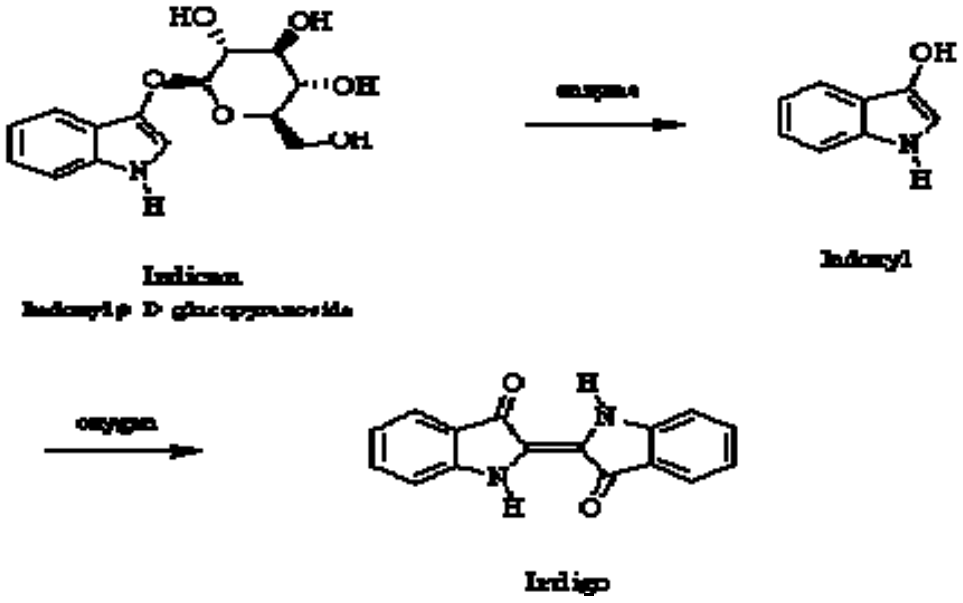
K 1.4g

Ca 3.9g

The ash (4.4g) contains upto 9.5% soluble potassium salts.

Indican[26]:

- Chemical name: 2,2'-BIINDOLINYLINDEN -3, 3'-DION.
- Colourless organic compound, naturally occurring in Indigofera tinctoria.
- Precursor of indigo dye.
- A Glycoside

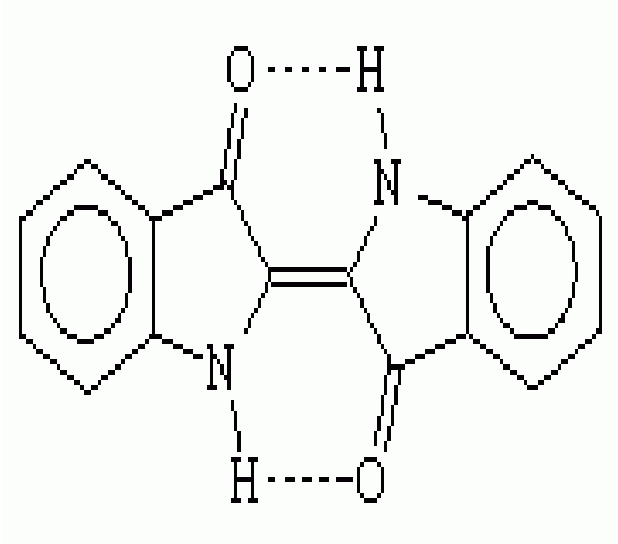


Indican

Indoxyl

Indigo

Indigotin:



- Molecular formula : C16H10N2O2
- Blue crystalline compound
- Principal colouring matter of indigo
- Indigotin is responsible for its anti-septic and astringent activities

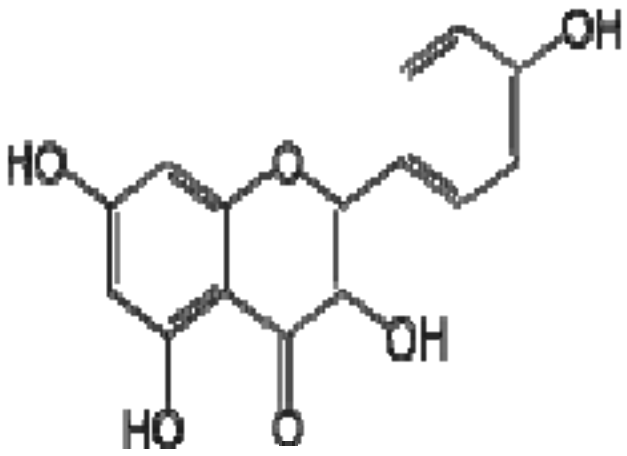
Apigenin:

- One of the flavanoids
- It is responsible for its anti- oxidant, anti- inflammatory and anti- tumor properties.

Rotenoids:

- Extracts of indigo leaves contains rotenoids .
- Has insecticidal properties against mosquito larvae .

Kaempferol:



Chemical name : 3,5,7-trihydroxy-2-(4-hydroxyphenyl)-4H-1-benzopyran-4-one

Chemical formula : C15H10O6

ETHNOMEDICAL USES[24]

Leaves:

- Juice of leaves is given in asthma, whooping cough, palpitations of the heart lung disease and kidney complaints.
- The leaves are externally applied as a poultice in various skin affections like scabies and to cleanse and heal wounds and ulcers.
- Juice of the leaves has great repute as a cure for hydrophobia, being administered both internally and externally.
- Juices of the leaves and indigo in powder are mixed with honey in enlargement of liver and spleen, epilepsy and other nervous disorders.
- Indigo is applied to reduce swellings in the body, to bites and stings of venemous stings and also as soothing application to burns and scalds.
- The leaves are made into an ointment which is applied to contused, inflamed or itchy parts.
- The leaves have virtues of an alterative nature and is given in hepatitis in the form of powder mixed with honey.
- The leaves nibbed up in water and applied to the abdomen helps in promoting urine output.

Roots:

- The root and stem are hot with a sharp, bitter taste.
- Laxative, expectorant, alexipharmic
- Promotes growth of hair

- Used in abdominal complaints, heart diseases, insanity.
- Cures vatha, tumours, fever, leucoderma, enlarged spleen, cephalalgia, injuries.
- Useful in difficult micturition, snake bite, caries tooth, hepatitis.
- Pounded roots are given in urinary complaints, bladder stones and in epilepsy.

EXPERIMENTAL STUDIES ON INDIGOFERA TINCTORIA

1. **Anti-hepatotoxic activity**

   Alcoholic extract of aerial parts of Indigofera tinctoria are found to be anti hepatotoxic against carbon tetra chloride induced hepatic injury in animals. (Indian J. Exp Biol, 1979, 17. 685 ;)

2. **Protective effects of Indigofera tinctoria L.** against D-Galactosamine / endotoxin – induced acute hepatitis in rodents. (Indian J. Exp. Biol 2001, Feb, 39(2): 181-4)

3. **Hypoglycemic activity**

   Ethanolic extract (50%) of Indigofera tinctoria showed hypoglycemic activity. (ibid, 1980, 18, 594)

4. **Anti-inflammatory and analgesic activity**

   Topical preparation of Indigofera tinctoria showed significant anti–inflammatory and analgesic activity. The anti-inflammatory effect of Indigofera tinctoria 10% was similar to the effect of piroxicam gel. Topical preparation containing Indigofera tinctoria chloroform extract showed analgesic effect in 10% w/w conc. in early phase with formalin test. The topical analgesic activity of extract was less than the analgesic activity of piroxicam gel. (Journal of Ind. med. Vol.4, Apr- Jun 2004 Pg. 5-8)

5. **Anti-neoplastic activity**

   Indirubin, a component of Indigofera tinctoria possesses anti–neoplastic action. It exerts its anti-carcinogenic effects by inhibition of DNA polymerase I and hence of DNA synthesis. It inhibited DNA synthesis in several cell- free assays and in-vivo in rats with walker 256 sarcoma. (Acta pharma sin, 1981, 16. 146)

6. **Anti-dyslipidemic activity**

The alcohol extract of Indigofera tinctoria showed a significant decrease in the plasma triglycerides (TG. 52%) (P<0.001), total cholesterol (TC, 29%) (P<0.05), Glycerol (Gly, 24%) and free fatty acids (FFA, 14%). The decrease was also accompanied by an increase in high density lipoproteins (HDL) by 9% and an increased HDL – C/TC ratio of 52% at the dose of 250 mg / kg of body weight. (J. Herb pharmacother – 2007; 7 (1) 59-64)

7. **Antidyslipidemic activity** of furano flavanoids isolated from Indigofera tinctoria: 3 furano flavones 1-3 and a rare flavonol glycoside 4 from the aerial parts of Indigofera tinctoria were isolated. The treatment with diastereomeric flavanoids mixture 1&2(80:20) significantly decreased the plasma triglycerides(TG) by 60%, total cholesterol (TC) 19%, glycerol(Gly) 13% and a free fatty acid (FFA) 25% accompanied with increase in high density lipoproteins- cholesterol(HDL-C) by 8%. The flavanoid 3 exhibited moderate anti-dyslipidemic activity. (Bio org. med. Chem Lett. 206. Jul 1; 16(13)

8. **Bioefficacy against larvae of Anopheles**.

In-vivo and in-vitro investigations on rotenoids from Indigofera tinctoria and their bio-efficacy against the larvae of Anopheles stephensi and adults of callosohruchus chinensis were found to be significant. (Journal of Biosciences. Vol. 18. 1993)

9. **Galactomannan from seeds**

A water soluble galactomannan from the seeds of Indigofera tinctoria were identified. (Leguminosae) (Carbohydrate Res. 157 (1986) 251)

Physio chemical standardization parameters of Indigofera tinctoria

Quantitative standards:

Foreign matter	-	Not more than 2%
Total ash	-	Not more than 10%
Acid – insoluble ash	-	Not more than 2%
Alcohol – soluble extract	-	Not less than 7.5%
Water – Soluble extract	-	Not less than 2.5%

PHARMACOGNOSTIC STUDY OF AVURI LEAF(Indigofera tinctoria L.)

MATERIALS AND METHODS

The leaves of Indigofera tinctoria L. were collected from Chengalpattu District and authenticated by Dr. Sasikala Ethirajulu, Botanist, Central Research Institute for Siddha, Arumbakkam, Chennai – 106. Free hand as well as microtome sections of leaf, petiole and petiolule were taken double stained.

Staining:

Alcoholic safranin (0.5%) counter stained with 0.25% fast green. This schedule gave good results for studying the histology of different tissues of the plant organs. All slides, after staining in safranin were dehydrated by employing graded series of ethyl alcohol (30%, 50%, 70%, 90% and absolute alcohol) and stained fast green in clove oil and xylol-alcohol (50-50) and passed through xylol and mounted in DPX mountant (Johansen, 1940). Cleaning for leaves for studying palisade ratio, stomatal number and stomatal index was done by using 5% sodium hydroxide along with chlorinated soda solution supplemented with gentle heat. Quantitative microscopy was carried out and values were determined as per the procedure given in Wallis (1997). Photomicrographs were taken with the help of Nikon Eclipse E200 Microscope.

Macroscopic:

Leaf :

Leaves compound; imparipinnate, alternate, stipulate, leaflets 9 to 13; 1.5 cm. long and 0.3 to 1.2 cm. wide, elliptic – oblong- ovate, membranous, pale greenish above, slightly glaucous beneath and turning grayish blue or black on drying. No characteristic smell, taste slightly bitter.

Microscopic:

Petiole:

Shows a plano – convex outline (Fig. II B). The epidermis is single layered and made up of small rectangular cells and a few cells bear glandular trichome. The sub-epidermal region consists of 2 to 4 layers of chlorenchyma cells except the basal portion, which is composed of 2 or 3 layers of collenchyma cells. It is followed by 2 to 3 rows of transversely elongated parenchyma cells.

The central parenchymatous tissue is traversed by 3 collateral triangular vascular bundles (Fig. IIB) 2 to 4 rows of pericyclic fibres seen as a cap outside the vascular bundles. There are 2 smaller accessory bundles on the dorsal side one on either side of the vascular bundle. These bundles also covered on the adaxial side by fibres.

Petiolule:

Transverse section of middle region of petiolule shows a circular outline (Fig. II A). The epidermis is single layered made up of small rectangular cells. Some cells elongate to form glandular trichomes. In the center an arc shaped vascular strand is seen. The ground tissue is made up of closely packed round thick walled parenchyma cells. In the distal end, the petiolule shows 2 smaller wings on the adaxial side (fig. II C). The rest of the portion shows similar structure of vascular bundle and ground tissue as in the transverse section of meddle region.

Lamina:

Transverse section of lamina shows a dorsiventral structure (Fig. II E). Epidermis is single layered. It is characterized by common occurrence of angular folds in the anti-clinical walls by the development of papillae and

frequently mucilaginous. Stomata present on both the epidermis. Trichomes present on both the surfaces but abundant on lower surface. The mesophyll is differentiated into outer 3 layered palisade tissue and inner 2 to 4 layers of round – oval parenchymatous spongy tissue (Fig.III H). The palisade cells are made up of columnar closely packed cells.

A few patches of veins scattered between palisade and spongy tissues. A few prismatic and rod shaped calcium oxalate crystals present in mesophyll cells.

Midrib:

Transverse section of midrib shows a small depression on adaxial face and convexity on the abaxial face. Epidermis is made up of single layer of rectangular cells. The hypodermal region consists of 2 to 3 layers of collenchyma cells. A single, collateral vascular bundle is situated in the centre (Fig. III G). pericyclic fibres present around the main vascular strand. The ground tissue is made up of round-oval thin-walled parenchyma cells. Prismatic and rod shaped crystals are seen in the ground parenchyma and phloem parenchyma cells.

Trichomes:

They are non-glandular, (Fig. III J) equal or unequal two armed trichomes.

Epidermis in surface view:

Adaxial foliar epidermal cells are penta – octagonal in surface view. The margins of the cells are slightly wavy (Fig. III I). It is perforated by stomata that are similar in size to those seen on abaxial epidermis but the frequency is less. The abaxial epidermis is made up of cells that are wavy in outline in surface view (Fig. III J). Stomata are more frequent as in the abaxial epidermis

16.5 to 18/mm^2, abaxial epidermis 35 to 38/mm^2; Vein islet number 16 to 18/mm^2 (Fig. II D); Palisade ratio – 3 (Fig. II F).

Powder:

Greenish gray; shows groups of mesophyll cells, aseptate fibres, pitted vessels; unicellular hairs and rarely prismatic crystals of calcium oxalate.

AVURI ILAI CHOORNAM

(Indigofera tinctoria Linn.)

Collection of the drug:

The leaves of Indigofera tinctoria were collected at Chengalpattu and identified by a botanist.

Preservation and storage:

The leaves were washed in fresh water and cleaned thoroughly, and were allowed to dry in shade, made into choornam and were stored in dry, moisture proof containers

Preparation of Choornam:

The dried leaves were made into a fine powder and sifted through a white cloth (Vasthirakayam). Then it was purified by steam – cooking in milk (Pittaviyal method). The same was later powdered and sifted again and preserved.

Storage of Choornam:

The choornam was stored in a clean, air tight container.

Administration of the drug:

Form of drug	Route of administration	Dose	Vehicle	Time of administration
Choornam	Enteral	1g	Lukewarm water (30 ml)	Twice a day, After food.

IDENTIFICATION OF PLANT INDIGOFERA TINCTORIA'S CONSTITUENTS BY PHYTO CHEMICAL TESTS:

The drug powder and various extracts of Avuri Ilai Choornam were subjected to chemical tests for identification of its active constituents.

Test for Alkaloids:

A small portion of the solvent, free chloroform, alcoholic and aqueous extracts were treated separately with few drops of dilute HCl and filtered. The filter may be tested carefully with alkaloidal reagents such as,

a. Mayer's reagent - Yellow precipitate
b. Dragendroff's reagent - Orange brown precipitate
c. Wager's reagent - Reddish brown precipitate

Test for Carbohydrates:

Molisch's Test:

Filtrate was treated with 2-3 drops of 1% alcoholic alpha – napthol solution and 2 ml of concentrated H_2SO_4 was added along the sides of the test tube. Appearance of brown ring at the junction of 2 liquids shows the presence of carbohydrates.

Test for Glycosides:

Another portion of Avuri Ilai Choornam was hydrolysed with HCl for few hours on a water bath and the hydrolysate was subjected to Legals test.

Berntrager's test to detect the presence of glycosides:

a. Legals test:

To the hydrosylate, 1 ml of pyridine and few drops of sodium nitro prusside solution were added and then it was made alkaline with sodium

hydroxide solution. Appearance of pink to red colour shows the presence of glycosides and aglycones.

Test for Phytosterol:

Lieberman Burchard Test:

1 gm of the extract of Avuri Ilai Choornam was dissolved in few drops of dry acetic acid. 3 ml of acetic anhydride was added followed by few drops of concentrated sulphuric acid. Appearance of bluish green colour shows the presence of phytosterol.

Test For Saponins:

The extract of Avuri Ilai Choornam was diluted with 20 ml of distilled water and it was agitated on a graduated cylinder for 15 minutes. The formation of 1 cm layer of foam shows the presence of saponins.

Test For Tannis And Phenolic Compounds:

Small quantities of various extracts were taken seperately in water and tested for the presence of phenolic compounds and tannins by adding dilute ferric chloride solution(5%). The formation of violet colour shows its presence.

Test for proteins and free aminoacids:

Small quantities of various extracts of Avuri Ilai Choornam were dissolved in few ml of water and treated with ninhydrin reagent. Appearance of purple colour shows the presence of proteins and free amino acids.

Test for flavanoids:

With aqueous sodium hydroxide solution the extract gives blue to violet colour if anthocyanins are present; yellow colour if flavones are present; Yellow to orange, if flavanones are present.

Results for Phytochemical studies:

S.No.	Constituents	Avuri Ilai Choornam
1.	Starch	+
2.	Tannins	+
3.	Sugar	-
4.	Alkaloids	+
5.	Steroids	+
6.	Proteins and Amino Acids	+
7.	Glycosides	+
8.	Phenols	+
9.	Flavanoids	+
10.	Saponins	+

Inference:

The given sample of Avuri Ilai Choornam showed presence of the following phytochemicals:

- Starch
- Tannic acid
- Steroids
- Alkaloids
- Proteins and Amino-acids
- Glycosides
- Phenols
- Flavanoids

METHODOLOGY FOR BIO-CHEMICAL ANALYSIS

Preparation of extract:

5 gm of Avuri Ilai Choornam was weighed accurately and placed in a 250 ml clean beaker and added with 50 ml of distilled water. Then it was boiled well for about 10 mins. Then it was cooled and filtered in a 100 ml volumetric flask and made upto 100 ml with distilled water.

Test for Calcium:

2 ml of extract was taken in a clean test tube. To this 2 ml of 4% ammonium hydroxide solution was added. Presence of Calcium is denoted by formation of a white precipitate.

Test for Iron (ferric):

The extract was treated with glacial actic acid and potassium ferrocyanide. Presence of Ferric iron is denoted by a blue colour.

Test for Iron (ferrous):

The extract was treated with conc. HNO3 and ammonium thiocyanate. Presence of Ferrous iron is denoted by formation of a blood red colour.

Test for Sulphate:

2ml of the extract was added to 5% barium chloride solution. Presence of Sulphate is denoted by formation of a white precipitate.

Test for Chloride:

The extract was treated with silver nitrate solution. The presence of Chloride is denoted by formation of a white precipitate.

Test for Carbonate:

The extract was treated with concentrated HCl. If Carbonate is present, it is denoted by effervescence.

Test for Phosphate:

The extract was treated with ammonium molybdate and conc. HNO3. If Phosphate is present, it is denoted by the formation of a yellow precipitate.

Test for insaturation:

1 ml of potassium permanganate solution is added to the extract. The presence of unsaturation is denoted by decolourisation.

Results for biochemical analysis:

Preliminary acid, basic radicals:

S.No.	Constituents	Avuri Ilai Choornam
1.	Calcium	+
2.	Iron (Feric)	-
3.	Iron (Ferrous)	+
4.	Sulphate	+
5.	Chloride	+
6.	Carbonate	Trace
7.	Phosphate	+
8.	Unsaturation	+

Inference:

The acid radicals found to be present in the given sample of Avuri Ilai Choornam were :

- Chloride
- Sulphate
- Phosphate
- Trace Amounts of Carbonate

The basic radicals found were:

- Calcium
- Ferrous iron

Miscellaneous :

Saturation: Unsaturated compounds were found to be present.

Results for quantitative biochemical analysis:

Equipment used: Atomic Absorption spectrometer (AAS) – Make : Varian,. Australia

S.No.	Test Parameter	Result
1.	Calcium as Ca, (%)	2.08
2.	Phosphorus as P, (%)	0.14

Inference :

The given sample of Avuri Ilai Choornam was found to contain 2.08% of Calcium (Ca) and 0.14% of Phosphorus (P).

THIN LAYER CHROMATOGRAPHY (TLC) METHODOLOGY:

2 gm of the sample was soaked in 20 ml of rectified spirit (90%) for 18 hrs and boiled for 10 minutes and filtered. The filtrate was concentrated and made upto 5 ml. 25ml of alcoholic extract was applied on Merck Aluminium plate pre-coated with sitica gel 60 F_{254} of 0.2mm thickness along with the ingredients using Linomat IV applicator. The plate was developed in Toluene; ethyl acetate 5: 1.5 V/V. The plate was visualised in UV 254 and 366 nm. The plate was then dipped in Vanillin-Sulphuric acid and heated in air oven at 105°C till the spots appeared.

Results for Thin Layer Chromatography (TLC) Study:

S.No.	UV 254nm		UV 366nm		With spray reagent	
	Colour	**Rf**	**Colour**	**Rf**	**Colour**	**Rf**
1.	Green	0.11	Pink	0.11	-	-
2.	Pale green	0.24	Dark pink	0.24	Light grey	0.24
3.	Pale green	0.37	Dark pink	0.37	Dark grey	0.46
4.	-	-	Dark pink	0.51	Dark grey	0.51
5.	-	-	Dark pink	0.62	-	-
6.	Dark green	0.65	Yellow	0.65	-	-
7.	Pale green	0.68	Dark pink	0.68	-	-
8.	Pale green	0.81	Dark pink	0.81	Light grey	0.81

Inference:

The Rf values of Avuri Ilai Choornam (Indigofera tinctoria) when visualised in UV 254 nm, UV 366nm and with spray reagent were found to be 0.11, 0.24, 0.37, 0.65, 0.68 and 0.81; 0.11, 0.24, 0.37, 0.51, 0.62, 0.65, 0.68 and 0.81; 0.24, 0.46, 0.51, 0.81 respectively.

ANTI – MICROBIAL STUDY

Method:

The anti – bacterial activities of different extracts of Avuri Ilai Choornam (Indigofera tinctoria) were studied by Disc diffusion method against the following organisms.

1. Streptococcus mutans
2. Staphylococcus aureus
3. Escherichia coli
4. Klebsiella pneumoniae
5. Pseudomonas aeruginosa

Extracts of Avuri Ilai Choornam (Indigofera tinctoria) were used in the concentration of 50 and 25 and 10µl using their respective solvents. Ciprofloxacin (50 mcg / disc) was used as standard. The disc diffusion method was employed for the screening of anti- bacterial activity.

Disc Diffusion Method:

A suspension of organism was added to sterile soya bean casein digest agar media at 45^0C, the mixture was transferred to sterile petridishes and were allowed to solidify. Sterile discs, 5 mm in diameter, dipped in solutions of different extracts, standard and a blank was placed on the surface of agar plates. The plates were left standing for one hour at room temperature as a period of pre incubation diffuse to minimize the effects of variation in time between the applications of the different solutions. Then the plates were incubated at 37^0C for 18 hours and observed for anti – bacterial activity. The diameter of zones of inhibition were observed and measured. The average area of zones of inhibition were calculated and compared with that of standards.

RESULTS FOR ANTI – MICROBIAL STUDY

Organism	Standard drug Ciprofloxacin 50 mcg / disc	Test drug (Avuri ilai choornam µ1 / disc)		
		Zone of inhibition in mm		
		10 µ1	25 µ1	50 µ1
Strep. mutans	31	14	18	21
Staph. aureus	30	17	20	23
E.coli	31	19	21	24
K.pneumoniae	31	16	19	21
Ps. aeruginosa	30	14	18	20

14 mm – low sensitive, 15 mm – moderate, above 16 mm – highly sensitive

(Note: Sample concentration : 4 gm – 40 ml of solvent in 10µ1, 25 µ1 and 50 µ1/ disc.

Standard for bacteria : Ciprofloxacin HCl, 50 mcg/ disc)

Inference:

Ethanolic and chloroform extracts exhibited significant activity against Streptococcus mutans, Staphylococcus aureus, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa at 25 µ1, 10 µ1, 10µ1, 10µ1, 25µ1 respectively. When compared with the standard drug ciprofloxacin (50 mcg / disc), the results showed that the extracts were active against the bacterial organisms.

MATERIALS AND METHODS

Test drug:

Avuri ilai choornam (Indigofera tinctoria) was the trial drug used in the study which was collected and processed by the method as described in Sarabenthirar Vaithiya muraigal, gunma roga sigichai. pg no: 183

Preparation of drug for dosing:

The drug used for the study was suspended each time with 1% (w/v) solution of sodium carboxy methyl cellulose before administration.

Drugs and chemicals:

Fine chemicals used in these experiments were obtained from Sigma Chemicals Company, U.S.A. Other analytical grade chemicals were obtained from S.d. Fine Chemicals Ltd., Mumbai.

Experimental animals:

Colony inbred animals strains of Wistar rats of either sex weighing 200 - 250 g were used for the pharmacological studies and Swiss albino mice of single sex weighing 20-25 g were used for toxicological studies.

The animals were kept under standard conditions 12:12 (day/night cycles) at 22^0C room temperature, in polypropylene cages. The animals were fed on standard pelleted diet (Hindustan Lever Pvt Ltd., Bangalore) and tap water *ad libitum*. The animals were housed for one week in polypropylene cages prior to the experiments to acclimatize to laboratory conditions. The experimental protocol was approved by the Institutional Animal Ethical Committee (IAEC).

Acute Oral Toxicity Study:

Acute oral toxicity was conducted as per the OECD guidelines (Organization of Economic Cooperation and Development) 423 (Acute Toxic Class Method). The acute toxic class method is a stepwise procedure with 3 animals of a single sex per step. Depending on the mortality and /or moribund status of the animals, on the average 2-4 steps may be necessary to allow judgment on the acute toxicity of the test substance. This procedure results in the use of a minimal number of animals while allowing for acceptable data based scientific conclusion.

The method uses defined doses (5, 50, 300, 2000 mg/kg body weight) and the results allow a substance to be ranked and classified according to the Globally Harmonized System (GHS) for the classification of chemicals which cause acute toxicity.

Swiss albino mice of single sex weighing 20-25 g were fasted overnight, but allowed water *ad libitum*. Since the formulation is relatively non toxic in clinical practice the highest dose of 2000 mg/kg/p.o (as per OECD guidelines "Unclassified") was used in the acute toxicity study.

The animals were observed closely for behavioral toxicity, if any by using FOB (Functional observation battery)

Results for acute toxicity study:

Avuri ilai choornam at the dose of 2000 mg/kg/po did not exhibit any mortality in mice as per OECD 423 guidelines the dose is said to be "unclassified" under the toxicity scale. Hence further study with higher doses was not executed.

Analgesic study:

Analgesic activity - Tail Flick method:

Withdrawal of tail (Tail Flick) for noxious thermal (radiant heat) can be used for screening drugs with analgesic activity. Radiant heat can be generated by passing electrical current through nichrome wire mounted in an analgesiometer.

Procedure:

Wistar albino rats of either sex weighing between 200-250g were assigned into 3 groups of 6 animals each.

Group 1 : received hot water served as solvent control

Group 2 : received the standard drug Diclofenac sodium

Group 3 : received the test drug

The base of the tail of the test rats is placed on a nichrome wire. The tail withdrawal for the radiant heat (flicking response) is taken as the end point. Normally the rats withdraw their tails within 3 – 5 secs. A cutoff time of 10 – 12 secs is used to prevent damage to the tail. Any animal failing to withdraw its tail in 3-5 secs is rejected from the study.

The reaction time of test drug, standard and control are taken at intervals of 30, 60 and 120 mts. A reaction time (withdrawal time) increment of 2-5 secs more than the control animals can be considered for analgesic activity of the drug.

Results for analgesic activity of Avuri ilai choornam:

Analgesic activity of Avuri ilai choornam using Tail flick Method:

Groups	Tail flick response (Sec)			
	0 min (Sec)	**30 min (Sec)**	**60 min (Sec)**	**120 min (Sec)**
Control	2.266± 0.396	2.293± 0.96	2.36±0.367	2.482± 0.653
Avuri Ilai Choornam (500mg/kg. p.o.,)	2.766 ± 0.361 ***	3.066 ± 0.450 ***	4.266 ± 0.067 ***	4.762 ± 1.203 ***
Standard Dic.sodium 500mg/kg/po	2.266 ± 0.391 ***	3.530± 0.450 ***	4.533± 0.388 ***	5.803± 0.799 ***

n=6, Values are expressed as mean ± S.D using followed by paired T – test

***P<0.001 as compared with control.

Inference:

The trial drug Avuri ilai choornam exhibited significant analgesic activity (P<0.001) when compared to the control groups.

Anti-inflammatory study:

Anti inflammatory activity was evaluated in acute model of inflammation.

Acute model:

Wistar albino rats of either sex weighing between 200-250g were assigned into 3 groups of 6 animals each.

Group 1 : received distilled water which served as solvent control

Group 2 : received the standard drug Diclofenac sodium

Group 3 : received the test drug

Carrageenan induced hind paw edema:

The carrageenan assay procedure was carried out according to the method of Wintar *et al.* (1962). Edema was induced by injecting 0.1 ml of 1% solution of carrageenan in saline into the plantar aponeurosis of the left hind paw of all the 3 groups of rats. The extract, reference drug and the control vehicle (distilled water) were administered 60 min prior to the injection of the carrageenan. The volumes of edema of the injected and contra lateral paws were measured at +1, 3 and 5 hrs after induction of inflammation using a plethysmometer (Bhatt *et al*., 1977) and percentage of anti-inflammatory activity was calculated.

Results for anti-inflammatory action of Avuri ilai choornam (Indigofera tinctoria):

Anti inflammatory activity of Avuri ilai choornam in carrageenan-induced hind paw edema in rats:

Groups	Paw volume (ml) by mercury Displacement at regular interval of time					
	0min	**30min**	**60min**	**120min**	**240min**	**15 hrs**
Control	1.483 ± 0.1915	1.766 ± 0.1366	2.06 ± 5.164	2.195 ± 7.7619	2.33 ± 0.136	2.33 ± 0.4612
Avuri ilai choornam (500mg/kg. p.o.,)	1.683 ± 0.1472 ns	1.808 ± 0.1497 ns	2.0 ± 0.303 ns	1.85 ± 0.021 ***	2.33 ± 0.1366 ***	1.533 ± 0.1033 ***
Standard (Dic.Sodium 5 mg/kg/po)	0.835 ± 0.065 ns	1.315 ± 0.069**	1.128 ± 0.049**	1.011 ± 0.056**	0.896 ± 0.048**	0. 85 ± 0.054

n=6; Values are expressed as mean ± S.D followed by paired T – test,

ns - Non significant as compared with control;

P< 0.001 (***), P <0.003(**) as compared with control

Inference:

In the acute phase inflammation model (carrageenan induced hind paw edema) Avuri ilai choornam showed significant (P<0.001) anti-inflammatory activity.

The anti-inflammatory response was noticed at the end of 120 mts of administration whereas standard drug diclofenac sodium exhibited immediate response. The results obtained from the study establish its efficacy with good correlation with clinical study findings reported in the thesis.

CLINICAL ASSESSMENT

The disease Azhal keel Vayu is one among the ten types of Keel Vayu, as in Noi Nadal Noi Muthal Nadal, Part II.

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Derangement of Vali and Azhal humours in the body causes Azhal keel vayu. The treatment aims towards normalizing the deranged humors i.e. Vali and Azhal.

CLINICAL STUDY PATTERN

Selection of Patients:

To study the anti-inflammatory and analgesic activities of the drug, Avuri Ilai Choornam, patients were selected between the age group of 35- 70 years, with Azhal Keel Vayu, at Government Arignar Anna Hospital , Chennai.

Sample size : 50

Duration of the treatment : 48 days

Inclusive Criteria

- Pain in Major joints
- Swelling
- Crepitus on movement
- Restriction of movement
- Joint tenderness
- Radiological findings
- Age Group : 31-70 Yrs.

Exclusive Criteria:

- Rheumatic fever
- Rheumatoid arthritis
- Psoriatic arthrosis
- Pyogenic arthrosis
- Gouty arthritis
- Gonococcal arthrosis

Withdrawal criteria:

- Irregular medication
- Dual treatment

Study design: Open clinical trial

Diagnosis:

The patients were diagnosed by the symptoms and complete physical examination aided the diagnosis. X-rays were used to confirm the diagnosis.

Radiological findings:

- Sub chondral sclerosis
- Narrowing of the joint space
- Marginal osteophytes formation
- Soft tissue swelling

Line of treatment:

All the selected patients were given purgative on the first day and kept under rest for a day. Then they were subjected to routine clinical and laboratory investigations which includes,

- Routine blood sugar and urea
- Serum cholesterol
- Serum creatinine
- Urine examination

Enrollment and method of study:

Patients with the inclusion criteria given above were enrolled in the study after recording the baseline data. 1 gm of Avuri ilai choornam (Indigofera tinctoria) was administered with 30 ml lukewarm water, twice a day after food for a period of 48 days. The patients were advised to visit follow-up once in 7 days for a general observation related to dose adaptations and parallel clinical parameters were recorded. The efficacy follow-up was taken up at the end of 48 days of therapy.

Medical advice:

The patients were advised :

- to avoid foods like tubers, dhal, curds which are believed to exacerbate the Vatha Thathu
- to avoid cold, damp climate
- to bathe in lukewarm water
- not to sleep on bare floor
- to take easily digestible and highly nutritive foods such as greens
- to do mild exercises which would strengthen the quadriceps muscle, on which the knee is largely dependant for its stability.
- to avoid prolonged immobilization as it leads to the stiffening of the joint.

The observations regarding,

- age variation
- sex difference
- signs and symptoms before and after treatment
- results

were recorded and tabulated as follows.

AGE DISTRIBUTION

S.No.	Age in Years	No. of patients	Percentage
1.	31-40	5	10%
2.	41-50	20	40%
3.	51-60	16	32%
4.	61-70	9	18%

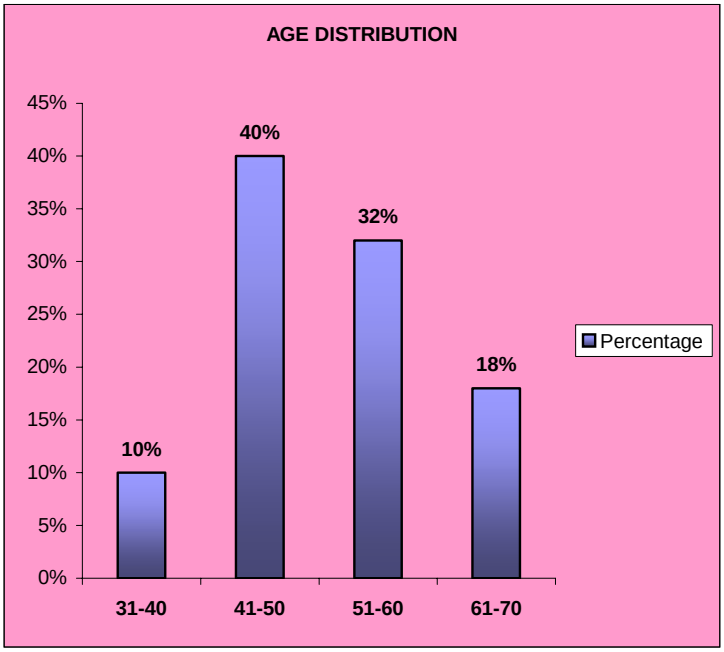

Fig. Showing age distribution

Inference:

Among 50 patients, 5 (10%) patients belong to the age group 30-40; 20 patients (40%) belong to the age group 41-50, 16 patients (32%) belong to the age group 51-60 and /9 patients (18%) belong to the age group 61-70. Maximum numbers of patients were found to be between 41-50 years.

SEX DISTRIBUTION

Sl.No.	Sex	No. of Patients	Percentage
1.	Male	16	32%
2.	Female	34	68%

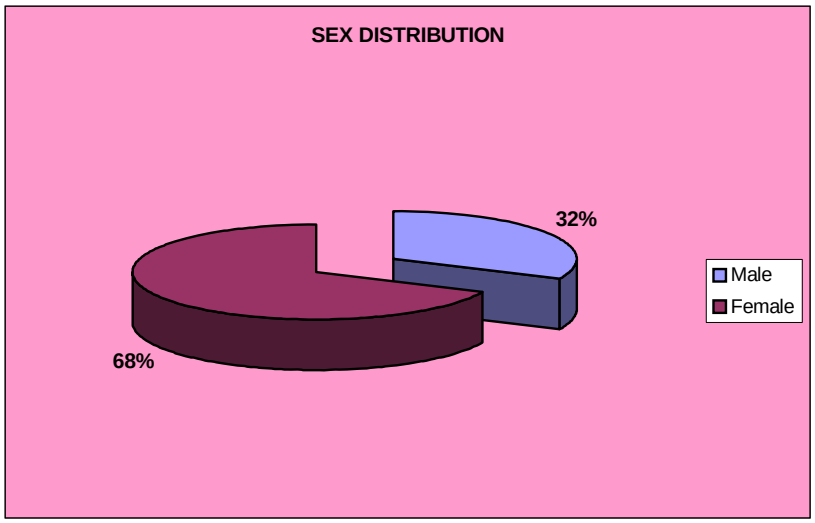

Fig. Showing sex distribution

Inference:

Among 50 patients, 16 (32%) were male and 34 (68%) were female. Female patients were more than male patients.

SOCIO- ECONOMIC DISTRIBUTION

S.No.	Socio-Economic Status	No. of Patients	Percentage
1.	Poor	27	54%
2.	Middle Class	17	34%
3.	Rich	6	12%

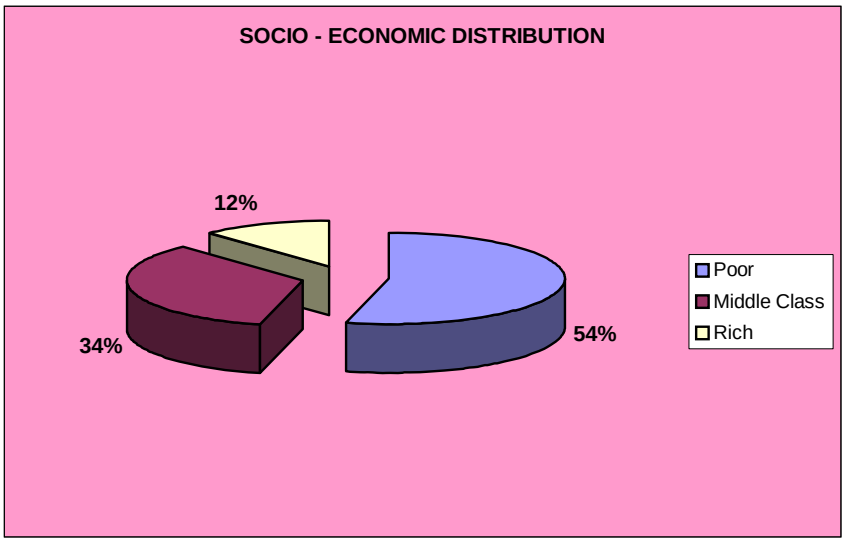

Fig. Showing Socio- Economic Status

Inference :

Among 50 patients, 27 (54%) were poor, 17 (34%) were from a middle class background and 6 (12%) were rich.

OCCUPATIONAL STATUS

S.No.	Occupation	No. of Patients	Percentage
1.	House wife	23	46%
2.	Daily labourer	16	32%
3.	Teacher	2	4%
4.	Farmer	6	12%
5.	Office Worker	3	6%

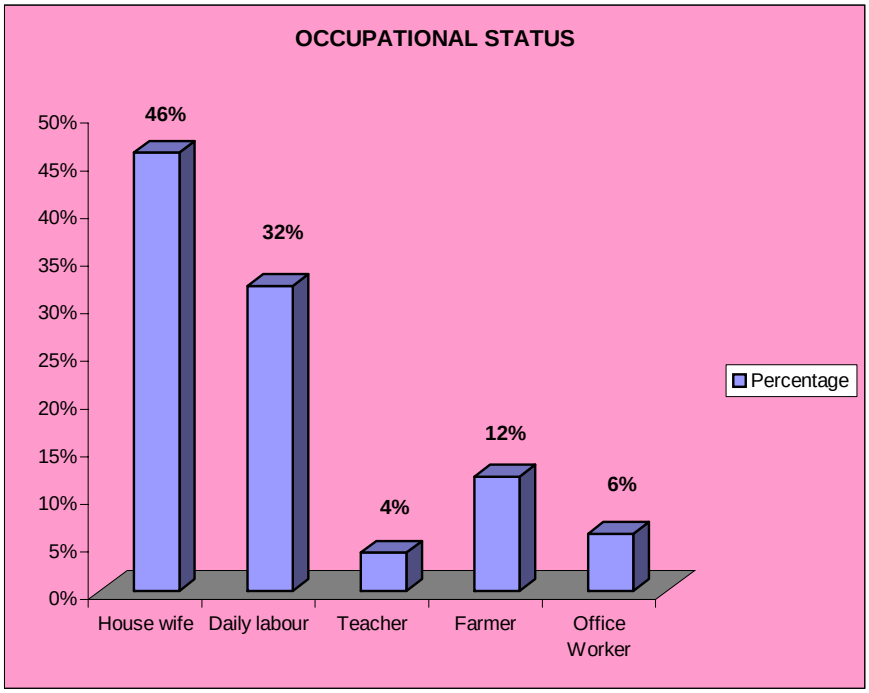

Fig. Showing occupational status

Inference :

Among 50 patients, 23 (46%) were housewives, 16 (32%) were daily laborers, 2 (4%) were teachers, 6 (12%) were farmers and 3 (6% were office workers.

IMPROVEMENT OF SIGNS AND SYMPTOMS

S. No.	Signs & Symptoms	Number of Patients			
		Before Treatment	After Treatment		Percentage of Improvement
			No improvement	Improvement	
1.	Pain	50	14	36	72
2.	Swelling	37	12	25	67
3.	Crepitus	36	14	25	61
4.	Restriction of movements	33	12	21	69
5.	Joint tenderness	22	7	15	68

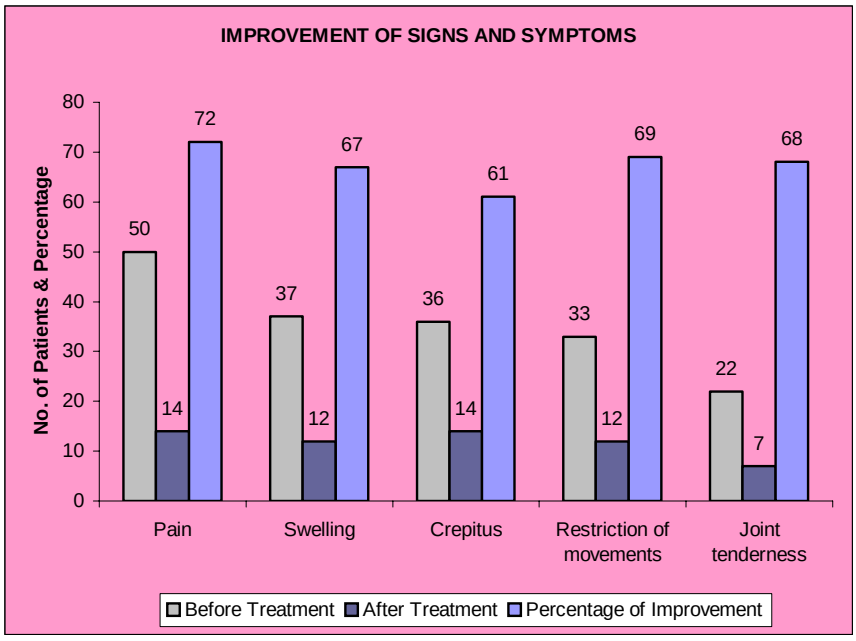

Fig. Showing Improvement of signs and symptoms

Inference:

Patients with the parameters given above were chosen for the study.

Among 50 patients who presented with pain, 36 (72%) reported back with reduction in pain, post-treatment; among 37 patients who presented with swelling, 25 (67%) reported back with reduced swelling; among 36 patients who presented with crepitus, 22 were found to have reduced crepitations, post-treatment; among 33 patients who presented with restricted movements of the knee, 21 reported back with free movements, post- treatment; among 22 patients who presented with joint tenderness, 15 reported with absence of joint tenderness, post- treatment.

GRADATION OF RESULTS

The results are based on the clinical improvement of signs and symptoms before and after treatment. Relief from all the symptoms was considered under good improvement category. Relief from pain, swelling, restriction of movements was considered under moderate improvement category. Relief from less than four symptoms was considered under mild improvement category.

	Good	Moderate	Mild	Total
No of patients	34	11	5	50
Percentage	68	22	10	100

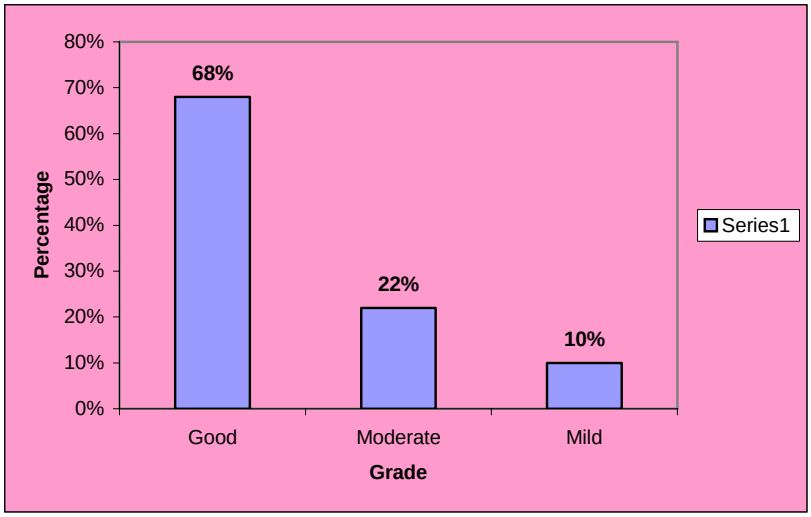

Fig. Showing Gradation of Results

Inference:

Among 50 patients, 68% showed good improvement, 22% showed moderate improvement and 10% showed mild improvement.

Methodology for statistical analysis:

To study variation in one or more attributes the data are expressed mostly as proportions. If a sample is divided into only two classes such successes and failures it is said to have a binomial.

p = number of individuals having a specific character / total number

P = character in which a binomial distribution is expressed

q = probability of non-occurrence of the same

Standard error of the proportion (S.E.P.):

It is the probability or proportional chances of positive or negative occurrence of an attribute or a character in a population or universe.

Binomial frequency distribution:

S.E.P. = √PQ\n

Probability of difference occurring by chance can be found by applying Z- test as done in the case of means.

Z = p-P / S.E.P.

Results for statistical analysis of the parameters of Azhal Keel Vayu:

S. No.	Parameters	Proportion		Statistical test Criteria	P.Value	Significance
		Before Treatment	After Treatment			
1.	Pain	100%	28%	0.164	P<0.001	*** (Significant)
2.	Swelling	74%	24%	0.143	P<0.001	*** (Significant)
3.	Crepitus	72%	28%	0.280	P<0.001	*** (Significant)
4.	Restriction of Movements	66%	24%	0.239	P<0.001	*** (Significant)
5.	Joint tenderness	44%	14%	0.197	P<0.003	**

n=50, Values are expressed as mean $\pm$ SD followed by student sample t- Test.

*** P<0.001, (**) P<0.003 as compared with that of before and after treatment.

DISCUSSION

Azhal Keel Vayu, one of the Vatha diseases is characterized by its classical symptoms namely, pain in the weight bearing joints especially the knee joints, swelling, crepitus on movement, restriction of movements and joint tenderness.

Avuri Ilai Choornam (Indigofera tinctoria) was chosen as the trial drug to treat Azhal keel vayu as prescribed in Sarabenthirar vaithya Muraigal Gunma roga sigichai (pg. 183)

Azhal Keel Vayu is caused by the derangement of Vali and Azhal humors. Avuri has kaippu suvai. Kaippu suvai is formed by the combination of kaatru and aagaya boothas. Kaippu Suvai (Bitter taste) is known for its ability to normalise the pitha kutram. The vehicle used was lukewarm water which has a vital role to play here. According to Siddha literature, the lukewarm water itself has the ability to cure diseases and deranged vatha Kutram is one among them. Thus, the drug with its vehicle can help in normalizing the deranged Vali and Azhal humors acting on the basis of ethirurai theory.

The Avuri leaves were subjected to pharmacognostic study for taxonomic identification. It revealed certain special features such as: mesophyll cells, aseptate fibres, pitted vessels, unicellular hairs and prismatic crystals of calcium oxalate.

The phytochemical test showed presence of Alkaloids, Carbohydrates, Phytosterols, Tannins, Flavanoids, and Phenols. Apigenin present in the leaves of Indigofera tinctoria is responsible for its anti – inflammatory activity.

Rf values were determined by subjecting the drug to Thin layer chromatography (TLC) study.

Biochemical analysis showed presence of Calcium, phosphorus, Iron (Ferrous), Sulphate, and Chloride.

- Calcium (Ca) is best known for its contribution to the strength of the skeleton. Ca deficiency leads to rupturing, dissolving or destroying the joints. Hence to treat Azhal Keel Vayu more Ca is needed.

- Phosphorus (P) is needed for maintenance and repair of all tissues and cells. It also reduces muscle pain. Its deficiency may cause bone pain, bone fragility and stiffness in the joints. The presence of phosphorus in the drug Avuri ilai choornam (Indigofera tinctoria) may strengthen the bone and reduce muscle pain.

- Chloride (Cl) may help in reducing the swelling of the affected knee joint. Oedema or swelling leads to hyponatremia. The metabolism of Sodium (Na) and Chloride (C1) are so much inter-related that abnormality in the metabolism of one is always accompanied by abnormality in the other. Thus loss of sodium is accompanied by loss of chloride also, though there is always more loss of Cl than Na. Thus the trial drug Avuri ilai choornam, containing chloride may help reduce swelling of the affected joints.

- Sulphate is present in the form of chondroitin sulphate in cartilages and tendons, which contributes to the strength of the cartilages. The trial drug contains sulphate which may help strengthen the wearing cartilages.

All the minerals mentioned above, present in the drug Avuri Ilai Choornam (Indigofera tinctoria) may play a role in treating Azhal Keel Vayu.

Anti-microbial study revealed that the drug is a highly sensitive antibacterial agent against Staphylococcus aureus, Streptococcus mutans, Escherichia coli, Klebsiella pneumoniae and Pseudomonas aeruginosa.

Acute toxicity of Avuri Ilai Choornam was studied and the drug was proved safe for administration as it did not exhibit any significant toxicity at 500 mg / kg body weight.

Avuri Ilai Choornam (Indigofera tinctoria) produced significant analgesic activity and significant anti-inflammatory activity at the end of 120 mts of administration. The findings of the experimental animal study indicate that Avuri ilai choornam possesses analgesic and anti-inflammatory property and thus lead pharmacological support to the traditional Siddha medical use of Avuri Ilai Choornam in treatment of Azhal Keel Vayu.

Open clinical trial with a sample size of 50 patients, a period of 48 days revealed the following features. Maximum number of patients affected by Azhal Keel Vayu belong to the age group 41-50 (40%) and the greater being females (70%). It was found that overweight, heavy work and life style habits influence the occurrence of Azhal Keel Vayu.

Administration of Avuri Ilai Choornam, 1g twice a day with lukewarm water, after food, for a period of 48 days produced relief from the subjected parameters such as pain in the affected joint, swelling, crepitus, restriction of movements and joint tenderness. Improvement in the subjected parameters was clinically and statistically significant. No adverse effects were observed during the course of this study.

SUMMARY

The study on Avuri ilai choornam to evaluate its efficacy in the management of Azhal Keel Vayu was carried out based on the evidences collected from Siddha literature.

The Pharmacognostic study was carried out at Central Research Institute for Siddha, Chennai-106 and C.L.Baid Metha College of Pharmacy, Thoraipakkam, Chennai.

The single drug was prepared as Choornam, then purified and stored.

Phytochemical tests showed the presence of Alkaloids, Flavanoids, Tannins and Phytosterols.

Rf values were determined by Thin layer chromatography.

Bio chemical analysis showed presence of Calcium, Phosphorus, Iron (Ferrous), Sulphate and Chloride.

Anti-microbial study proved it to be an effective antibacterial agent.

Pharmacological study was done for its anti-inflammatory and analgesic activities at C.L.Baid Metha college of Pharmacy, Thoraipakkam, Chennai. Choornam produced significant anti-inflammatory and analgesic activity.

Clinical assessment was carried out as an open clinical trial in the PG Gunapadam department at Arignar Anna College and Hospital for Indian medicine, Chennai. The patients were selected according to selection criteria.

Patients were carefully observed in regular visits and prognosis was documented.

Sex distribution, socio-economical status, occupational status was assessed.

Avuri ilai Choornam, 1gm, was administered twice a day with lukewarm water after food, for a period of 48 days. In the clinical trial, improvement in signs and symptoms like pain in the affected joint, swelling, joint tenderness were clinically and statistically significant.

No adverse effect was observed during course of study.

CONCLUSION

The evaluation of the efficacy of the single drug Avuri ilai Choornam in the management of Azhal Keel Vayu gave significant results.

Presence of alkaloids and flavanoids play a vital role in the management of Azhal keel vayu.

Pharmacological anti-inflammatory and analgesic activities strengthen the study.

Clinically the drug relieved the symptoms, pain, swelling, joint tenderness and restriction of movements.

Avuri ilai choornam with its vehicle regularised the three humors by stabilizing the pitha thathu and vatha thathu by its kaippu suvai.

No adverse effects were observed during the period of study.

In total, Avuri ilai Choornam plays a potential therapeutic role in management of Azhal Keel Vayu.

Avuri ilai Choornam needs further study with regard to the mechanism of action to develop it as a potent anti-inflammatory and analgesic agent.

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Fig. 1

Plant Avuri

Indigofera tinctoria L.

Fig. II

A - T.S. of Petiolule- Ground Plan

B - T.S. of Petiole – Ground Plan

C - T.S. o petiole – distal end – Ground Plan

D - Vein islets

E - T.S. of leaf

F - Paradermal section showing palisade cells

Fig. III

G - T.S. of Midrib- enlarged
H - T.S. of lamina
I - Adaxial foliar epidermis
J - Abaxial oliar epidermis

Abbreviations

Ab - Accessory bundle
Chl - Chlorenchyma
Co - Collenchyma
Ep - Epidermis
P - Parenchyma
Pa - Palisade tissue
Pf - Pericyclic fibre
Sp - Spongy tissue
St - Stoma
Tr - Trichome
Vb - Vascular bundle
Vi - Vein islet
Vs - Vascular strand
Wi - Wing

Fig. II

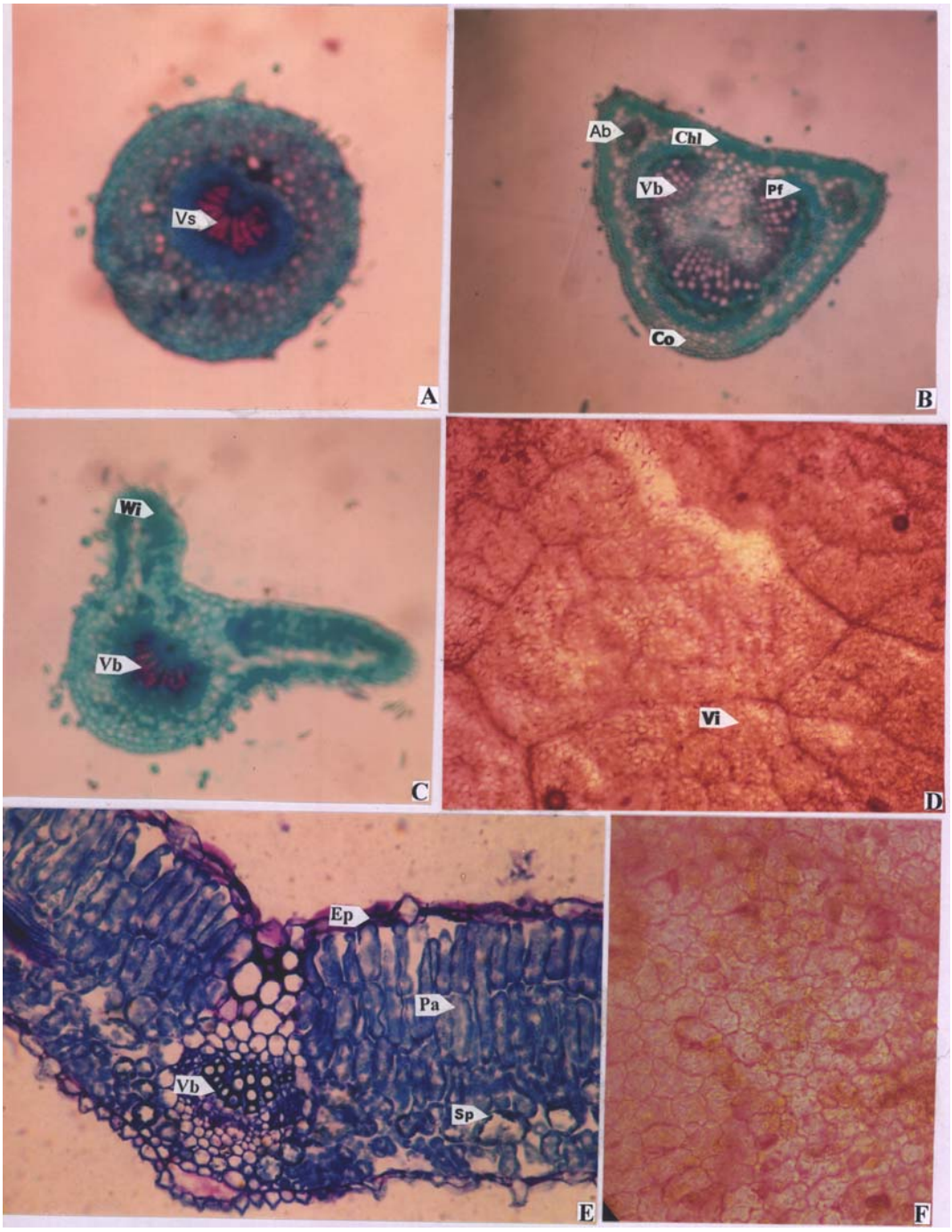
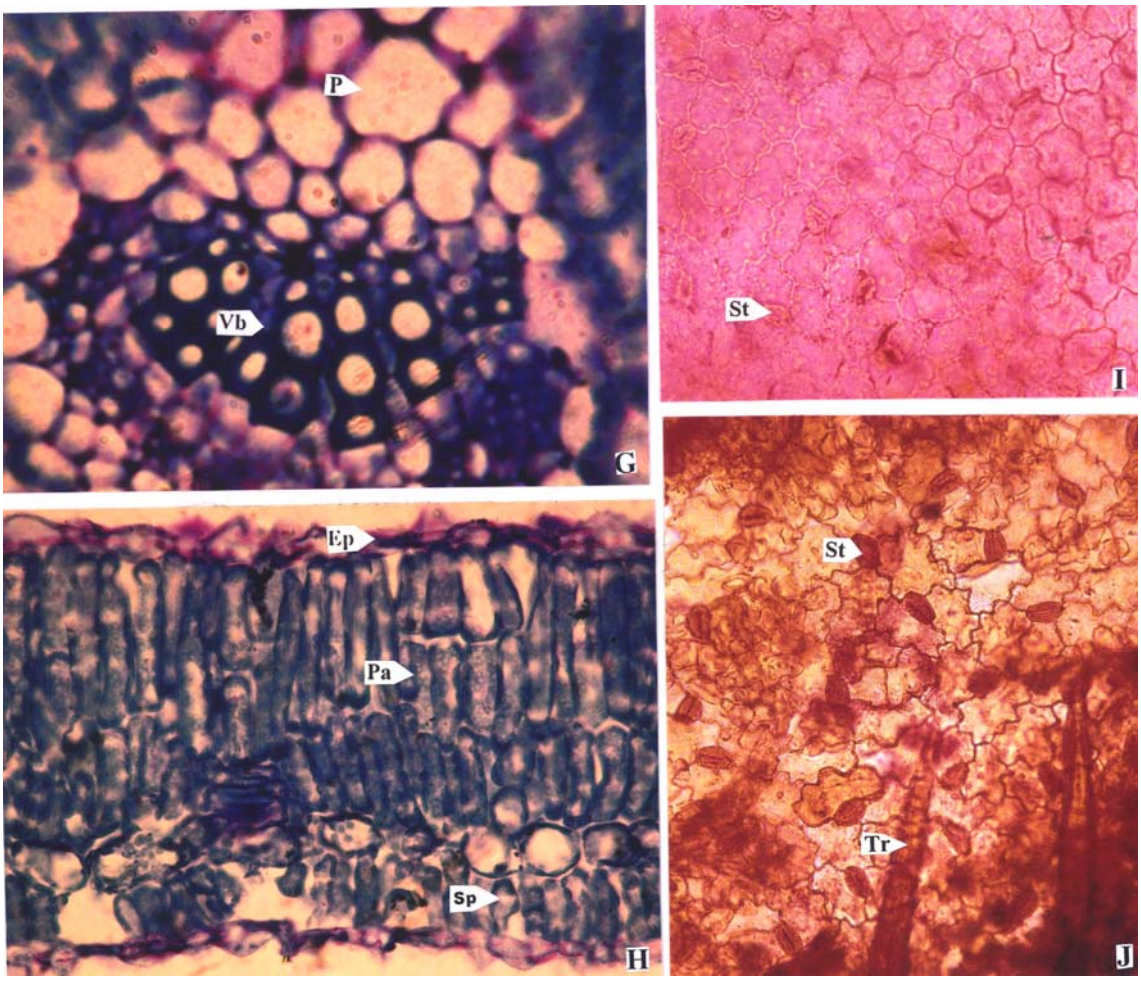


Fig. III



PHERETIMA POSTHUMA - POONAGAM

Alum - Padikaram

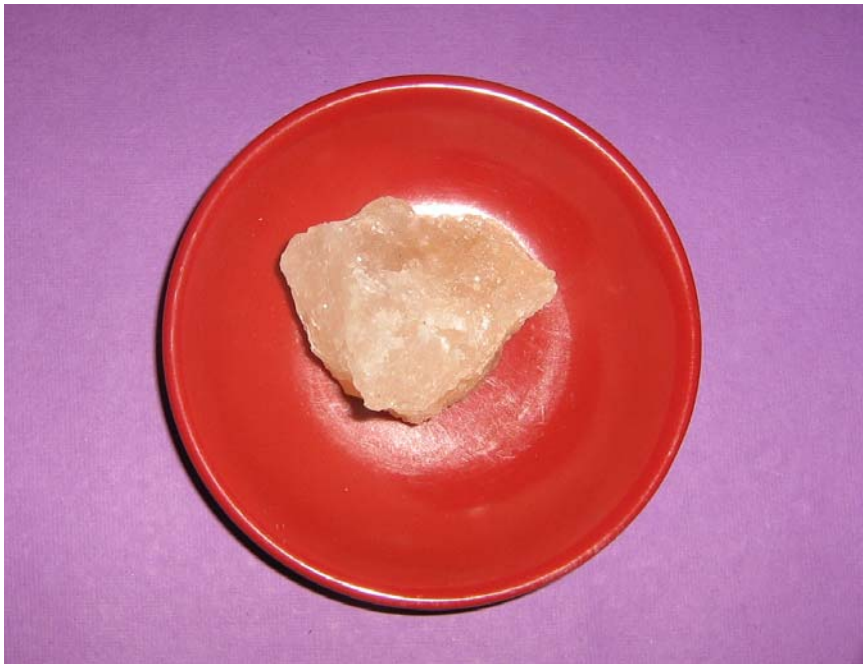
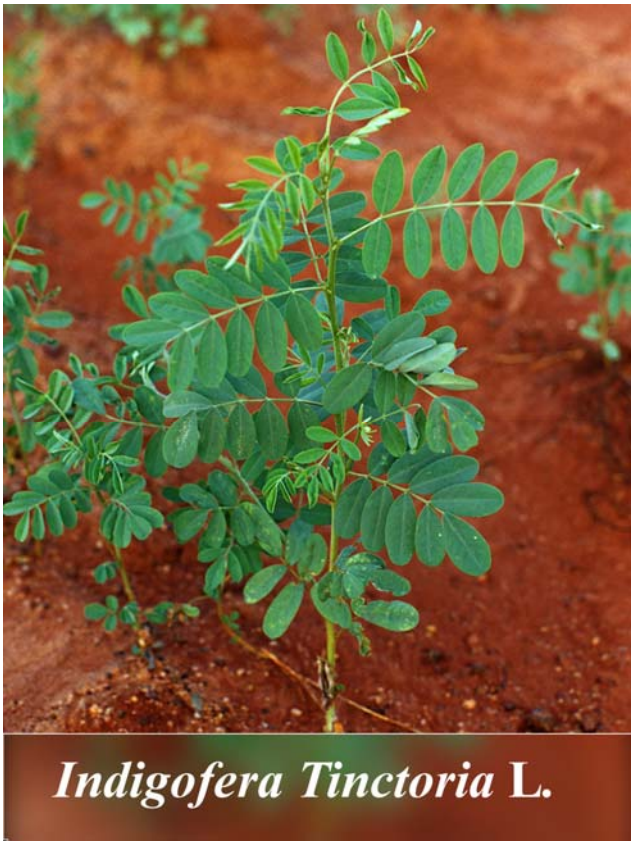


Fig. I

INDIGOFERA TINCTORIA

INDIGOFERA TINCTORIA

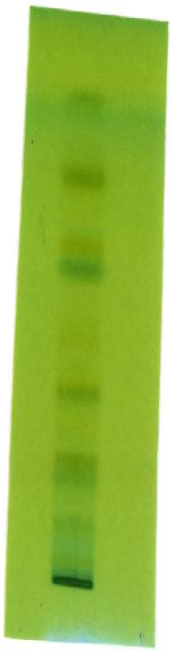


AVURI ILAI CHOORNAM

Ukkira Veera Chenduram

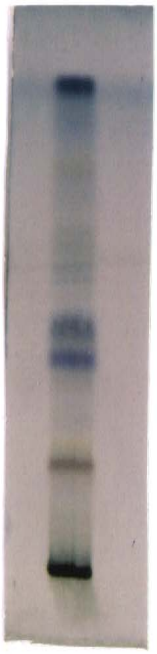
TLC of Avuri ilai churnam

λ 254 nm



λ 366 nm

With spray reagent



SI. NO	OP NO	NAME AGE/SEX	COMPLAINTS	NO OF DAYS	B.T & A.T	INVESTIGATION													X-RAY	RESULTS
						BLOOD								SERUM		URINE				
						TC CELLS/ CU MM	DC %			SUG	ESR		Hb	CL	Cr	Al	SUg.	Dep		
							P	L	E		½HR	1HR								
1	2009	Rajeswari 44/F	Pain, crepitations, Restricted movements, Swelling	50	B.T	9,800	63	32	5	131	20	38	10	183	0.7	-	Nil	-	Osteophytes, Soft tissue swelling, Narrowing of Jt.space	Good
					A.T	9,900	62	35	3	138	8	15	11	173	0.7	-	Nil	-		
2	2075	Deivanai 62/F	Pain, swelling, Crepitus, Restricted movements	48	B.T	9,800	57	38	5	145	15	32	11	200	0.7	-	Nil	-	Osteophytes, Soft tissue, Swelling, Narrowing of Jt.Space	Mode Rate
					A.T	9900	63	32	5	138	6	13	11	183	0.7	-	Nil	-		
3	2044	Gangadharan 60/M	Pain, Crepitus, Restricted movements Joint. Tenderness	48	B.T	10,000	62	33	5	114	5	11	11	213	-	-	Nil	-	Osteophytes, Narrowing Of Joint space	
					A.T	10,200	62	35	3	137	6	15	12	178	-	-	Nil	-		Mode Rate
4	6377	Radha 40/F	Paing, swelling Crepitus, joint Tenderness	50	B.T	9,200	57	36	5	130	12	25	12	179	-	-	Nil	-	Soft tissue Swelling, Narrowing of Jt.Space	Good
					A.T	9.300	63	32	5	121	4	10	12	159	-	-	Nil	-		
5	7825	Lalitha 52/F	Pain,crepitus , Restricted movements	48	B.T	10,200	60	34	6	110	12	20	11	165	0.9	-	Nil	-	Osteophytes, soft tissue swelling, narrowing of joint space	Good
					A.T	10,100	57	36	5	112	5	11	11	171	-	-	Nil	-		

SI. NO	OP NO	NAME AGE/SEX	COMPLAINTS	NO OF DAYS	B.T & A.T	INVESTIGATION													X-RAY	RESULTS
						BLOOD								SERUM		URINE				
						TC CELLS/ CU MM	DC %			SUG	ESR		Hb	CL	Cr	Al	SUg.	Dep		
							P	L	E		½HR	1HR								
6	7561	Vadivambal 50/F	Pain, Swelling, Crepitus, Restricted movements	48	B.T	9,800	60	34	6	156	11	20	11	156	1.0	-	Nil	-	Osteophytes, Soft tissue Swelling	Good
					A.T	9,700	62	34	4	123	8	16	11	161	0.9	-	Nil	-		
7	2075	Mary 45/F	Pain, crepitus, Joint tenderness	50	B.T	10,700	62	34	4	125	20	44	12	206	0.8	-	Nil	-	Soft tissue swelling, narrowing of joint space	Good
					A.T	10,200	58	38	4	112	5	12	12	185	0.8	-	Nil	-		
8	1876	Bhagvat singh 65/M	Pain, swelling crepitus, restricted movements	46	B.T	9,400	59	35	6	168	12	20	13	168	0.7	-	Nil	-	Osteophytes, Narrowing Of Joint space	Mode Rate
					A.T	9,200	60	34	6	102	6	14	12	163	0.7	-	Nil	-		
9	5569	Ellamal 45/F	Pain, swelling ,crepitus	45	B.T	9,800	59	35	6	133	12	25	10	182	1	-	Nil	-	Soft Tissue Swelling, Narrowing of Jt.Space	Good
					A.T	9.800	57	37	6	112	5	12	11	171	1	-	Nil	-		
10	2268	Chandra 50/F	Pain, Swelling ,crepitus, restricted movements	48	B.T	9,800	60	34	6	137	12	20	12	191	-	-	Nil	-	-	Good
					A.T	9,700	59	35	6	120	6	14	12	181	-	-	Nil	-		

SI. NO	OP NO	NAME AGE/SEX	COMPLAINTS	NO OF DAYS	B.T & A.T	INVESTIGATION													X-RAY	RESULTS
						BLOOD								SERUM		URINE				
						TC CELLS/ CU MM	DC %			SUG	ESR		Hb	CL	Cr	Al	SUg.	Dep		
							P	L	E		½HR	1HR								
11	6007	Ramasamy 70/M	Pain, Swelling, Crepitus, Restricted movements	50	B.T	9,800	57	81	1	89	12	20	13	182	0.9	-	Nil	-	Osteophytes, Narrowing of joint space	Mild
					A.T	9,600	57	36	7	92	8	16	12	171	0.9	-	Nil	-		
12	5194	Selvakumari 63/F	Pain, swelling crepitus, restricted movements	50	B.T	9,000	53	42	5	72	12	25	11	186	0.9	-	Nil	-	Ostepohytes, soft tissue swelling	Moderate
					A.T	9,100	57	36	7	85	7	14	11	175	0.9	-	Nil	-		
13	7124	Thara 51/F	Pain, swelling crepitus, restricted movements	48	B.T	9,800	57	36	7	110	15	30	12	168	1	-	Nil	-	Narrowing of joint space, soft tissue swelling	Good
					A.T	9,600	60	34	6	98	5	16	11	170	0.9	-	Nil	-		
14	7143	Indra 55/F	Pain, swelling crepitus, restricted movements	50	B.T	10,400	63	31	6	87	20	44	12	182	-	-	Nil	-	Osteophytes, soft tissue swelling	Good
					A.T	10,200	53	42	5	72	6	14	11	175	-	-	Nil	-		
15	6724	Sekar 41/M	Pain, crepitus, joint tenderness	48	B.T	9,800	60	34	6	81	5	11	13	167	0.9	-	Nil	-	Narrowing of joint space, soft tissue swelling	Good
					A.T	9,600	57	36	7	85	5	13	21	158	0.9	-	Nil	-		

SI. NO	OP NO	NAME AGE/SEX	COMPLAINTS	NO OF DAYS	B.T & A.T	INVESTIGATION													X-RAY	RESULTS
						BLOOD								SERUM		URINE				
						TC CELLS/ CU MM	DC %			SUG	ESR		Hb	CL	Cr	Al	SUg.	Dep		
							P	L	E		½HR	1HR								
16	6524	Shanti 50/F	Pain, Swelling, Crepitus Restricted movements	50	B.T	9,800	53	41	6	98	24	45	11	185	1	-	Nil	-	Soft tissue swelling, narrowing of joint space	Good
					A.T	9,800	57	39	4	85	8	18	12	175	1	-	Nil	-		
17	727	Ramachandran 60/M	Pain, Swelling crepitus restricted movements	48	B.T	10,200	62	28	1	89	4	9	12	209	0.7	-	Nil	-	Ostepohytes, Narrowing of joint space	Moderate
					A.T	10,100	53	41	6	85	5	12	12	185	0.7	-	Nil	-		
18	8874	Ganapathy 69/M	Pain, crepitus, restricted movements Joint tenderness	50	B.T	9,500	57	39	4	106	12	25	11	158	0.9	-	Nil	-	soft tissue swelling, Narrowing of Jt.Space,osteophytes	Mild
					A.T	9,400	53	41	6	98	8	12	12	162	0.9	-	Nil	-		
19	9094	Indra 64/F	Pain, swelling crepitus, restricted movements	48	B.T	10,800	68	26	6	210	12	30	11	172	1	-	Nil	-	Osteophytes, Narrowing of Jt. Space	Moderat
					A.T	10,700	62	34	4	160	6	15	12	168	0.9	-	Nil	-		
20	9606	Minnal 51/F	Pain, Crepitus Restricted Movements	48	B.T	9,400	57	38	5	98	12	25	12	196	-	-	Nil	-	Narrowing of joint space, soft tissue swelling	Good
					A.T	9,500	62	32	6	85	6	12	11	185	-	-	Nil	-		

SI. NO	OP NO	NAME AGE/SEX	COMPLAINTS	NO OF DAYS	B.T & A.T	INVESTIGATION													X-RAY	RESULTS
						BLOOD								SERUM		URINE				
						TC CELLS/ CU MM	DC %			SUG	ESR		Hb	CL	Cr	Al	SUg.	Dep		
							P	L	E		½HR	1HR								
21	1519	Sugumaran 56/M	Pain, Crepitus Restricted movements	48	B.T	10,500	62	32	6	170	4	9	12	210	-	-	Nil	-	Narrowing of joint space	Good
					A.T	10,200	58	27	5	162	5	12	12	186	-	-	Nil	-		
22	6898	Padma 47/F	Pain, Swelling, restricted Movements, joint tenderness	48	B.T	9,900	59	28	5	102	12	20	10	186	0.9	-	Nil	-	Soft tissue swelling, narrowing of Jt. Space	Good
					A.T	9,800	58	29	3	100	6	15	10	175	0.9	-	Nil	-		
23	4363	Kaladevi 48/F	Pain, swelling, restricted movements	50	B.T	9,800	57	38	5	110	7	15	10	185	0.7	-	Nil	-	Narrowing of Jt.Space	Good
					A.T	9,700	58	29	3	137	11	20	11	185	-	-	Nil	-		
24	5483	Palaniammal 70/F	Pain, Swelling, crepitus, joint tenderness	48	B.T	9,000	55	41	4	137	11	20	11	185	-	-	Nil	-	Osteophytes, Narrowing of Jt. Space	Mild
					A.T	9,200	58	21	5	135	8	18	12	180	-	-	Nil			
25	5781	Srimati 40/F	Pain,crepitus, restricted movements	50	B.T	9,400	57	38	5	89	10	15	10	182	1	-	Nil	-	Narrowing of Jt.Space	Good
					A.T	9,200	58	29	3	95	6	15	10	171	0.9	-	Nil	-		

SI. NO	OP NO	NAME AGE/SEX	COMPLAINTS	NO OF DAYS	B.T & A.T	INVESTIGATION														X-RAY	RESULTS
						BLOOD								SERUM		URINE					
						TC CELLS/ CU MM	DC %			SUG	ESR		Hb	CL	Cr	Al	SUg.	Dep			
							P	L	E		½HR	1HR									
26	5762	Saminathan 68/F	Pain, crepitus, restricted movements, joint tenderness	48	B.T	9,800	60	35	5	89	11	20	12	200	0.9	-	Nil	-		Osteophytes, narrowing of Jt. Space	Mild
					A.T	9,600	58	38	4	95	7	15	12	185	0.9	-	Nil	-			
27	6088	Kalaiselvi 47/F	Pain, swelling, restricted movements	50	B.T	9,200	58	36	6	146	5	12	11	168	-	-	Nil	-		Soft tissue swelling, narrowing of Jt. Space	Good
					A.T	9200	62	32	6	120	5	10	10	165	-	-	Nil	-			
28	6232	Pappathi 50/F	Pain,swelling, crepitus, joint tenderness	48	B.T	10,400	60	34	6	99	14	28	10	185	0.7	-	Nil	-		Soft tissue swelling	Good
					A.T	10,200	58	37	5	95	5	13	10	176	0.7	-	Nil	-			
29	8485	Elumalai 65/M	Pain,Swelling, crepitus, Restricted movements	48	B.T	9,000	57	38	5	96	12	25	12	209	1	-	Nil	-		Narrowing of Jt.Space	Moderate
					A.T	9,200	58	38	4	85	6	13	2	176	0.9	-	Nil				
30	8592	Sampath 55/M	Pain, swelling, crepitus, Joint tenderness	48	B.T	10,400	62	37	7	103	4	11	13	218	-	-	Nil	-		Soft tissue swelling, narrowing of joint space	Good
					A.T	10,200	58	36	6	95	5	13	13	185	-	-	Nil	-			

SI. NO	OP NO	NAME AGE/SEX	COMPLAINTS	NO OF DAYS	B.T & A.T	INVESTIGATION													X-RAY	RESULTS
						BLOOD								SERUM		URINE				
						TC CELLS/ CU MM	DC %			SUG	ESR		Hb	CL	Cr	Al	SUg.	Dep		
							P	L	E		½HR	1HR								
31	8635	Gabriel 54/M	Pain, crepitus, restricted movements	50	B.T	10,200	63	31	6	128	12	25	12	210	1	-	Nil	-	Narrowing of Jt.Space	Good
					A.T	10,200	59	38	3	120	8	15	1	185	1	-	Nil	-		
32	896	Rajendran 56/M	Pain, swelling, crepitus, joint tenderness	48	B.T	10,80	64	31	5	98	15	34	13	208	0.9	-	Nil	-	Soft tissue swelling	Good
					A.T	10,600	58	37	5	110	10	22	13	185	0.9	-	Nil	-		
33	8993	Kasthuri 55/F	Pain, swelling, crepitus, joint tenderness	50	B.T	9,600	59	38	5	92	20	44	11	186	-	-	Nil	-	Narrowing of joint Space	Good
					A.T	9,600	58	36	6	95	8	15	11	195	-	-	Nil	-		
34	536	Balkees 47/F	Pain, Swelling, restricted movements	50	B.T	9,800	59	35	6	103	11	20	9	225	0.7	-	Nil	-	Soft tissue swelling	Good
					A.T	9,500	57	37	6	102	5	13	10	212	0.7	-	Nil	-		
35	335	Suseela 69/F	Pain, swelling, crepitus, restricted movements	48	B.T	10,600	62	34	4	210	5	9	11	192	0.9	-	Nil	-	Osteophytes, narrowing of joint space	Mild
					A.T	10,400	58	38	4	185	6	12	11	185	0.9	-	Nil	-		

SI. NO	OP NO	NAME AGE/SEX	COMPLAINTS	NO OF DAYS	B.T & A.T	INVESTIGATION														X-RAY	RESULTS
						BLOOD								SERUM		URINE					
						TC CELLS/ CU MM	DC %			S U G	ESR		H b	CL	Cr	Al	S U g.	Dep			
							P	L	E		½H R	1HR									
36	320	Kuppammal 45/F	Pain,swelling, restricted movements, Joint tenderness	48	B.T	8,200	58	34	6	78	20	40	11	163	0.7	-	Nil	-		Soft tissue swelling,narrowing of joint space	Good
					A.T	8,200	57	35	6	85	8	15	11	165	0.7	-	Nil	-			
37	432	Lakshmi 43/F	Pain, swelling, restricted movements, joint tenderness	48	B.T	9,800	59	36	5	94	5	11	12	190	0.9	-	Nil	-		Narrowing of Joint space	Good
					A.T	9,600	58	34	6	98	5	12	12	185	0.9	-	Nil	-			
38	1835	Ramani 60/F	Pain, swelling, crepitus, joint tenderness	48	B.T	9,800	58	32	1	130	12	25	10	182	1	-	Nil	-		Osteophytes, narrowing of joint space	Moderated
					A.T	9,900	62	34	4	125	5	15	10	185	1	-	Nil	-			
39	3723	Jaya chandran 48/M	Pain,swelling, restricted movements	56	B.T	10,200	63	37	6	95	5	12	12	200	-	-	Nil	-		Soft tissue swelling	Good
					A.T	10,200	62	36	4	90	4	12	11	185	-	-	Nil	-			
40	9362	Godhandan 60/M	Pain, swelling, crepitus, restricted movements	50	B.T	10,700	62	34	4	95	12	30	11	209	0.7	-	Nil	-		Osteophytes, narrowing of joint space	Moderate
					A.T	10,800	58	36	6	102	6	15	12	195	0.7	-	Nil	-			

SI. NO	OP NO	NAME AGE/SEX	COMPLAINTS	NO OF DAYS	B.T & A.T	INVESTIGATION														X-RAY	RESULTS
						BLOOD								SERUM		URINE					
						TC CELLS/ CU MM	DC %			SUG	ESR		Hb	CL	Cr	Al	SUg.	Dep			
							P	L	E		½HR	1HR									
41	907	Victoria 38/F	Pain,swelling, restricted movements, Joint tenderness	48	B.T	9,400	59	35	6	85	12	30	12	187	0.7	-	Nil	-		Soft tissue swelling, narrowing of joint space	Good
					A.T	9,200	58	36	6	90	5	15	12	185	0.7	-	Nil	-			
42	92	Unni Krishnan 44/F	Pain, swelling, restricted movements	50	B.T	10,800	64	37	5	88	12	20	13	192	1	-	Nil	-		Narrowing of Joint space	Good
					A.T	10,600	60	34	6	95	6	13	13	185	1	-	Nil	-			
43	1864	Gowri 40/F	Pain, swelling, restricted movements, joint tenderness	48	B.T	10,000	57	29	4	115	11	20	11	170	0.9	-	Nil	-		Soft tissue swelling	Good
					A.T	10,200	58	38	4	105	5	13	12	171	0.9	-	Nil	-			
44	795	Jamuna 53/F	Pain, crepitus, restricted movements	48	B.T	9,000	55	40	5	100	10	32	11	211	-	-	Nil	-		Narrowing of joint space	Good
					A.T	9,00	58	36	6	101	7	15	10	195	-	-	Nil	-			
45	2978	Mala 40/F	Pain, crepitus, joint tenderness	48	B.T	9,800	59	34	7	98	20	40	10	173	0.7	-	Nil	-		Narrowing of Joint space	Moderate
					A.T	9,800	55	42	3	105	8	20	12	180	0.7	-	Nil	-			

SI. NO	OP NO	NAME AGE/SEX	COMPLAINTS	NO OF DAYS	B.T & A.T	INVESTIGATION													X-RAY	RESULTS
						BLOOD								SERUM		URINE				
						TC CELLS/ CU MM	DC %			SUG	ESR		Hb	CL	Cr	Al	SUg.	Dep		
							P	L	E		½HR	1HR								
46	2503	Chithra 60/F	Pain, crepitus, Restricted movements, joint tenderness	50	B.T	9,800	59	36	5	125	12	25	11	172	1	-	Nil	-	Osteophytes, narrowing of joint space	Moderate
					A.T	9,800	58	37	5	115	6	13	12	168	1	-	Nil	-		
47	3725	Elizabeth 48/F	Pain, swelling, restricted movements	56	B.T	6,800	68	28	4	92	5	11	13	185	-	-	Nil	-	Soft tissue swelling, narrowing of joint space	Good
					A.T	6,800	68	27	5	100	5	12	12	180	-	-	Nil	-		
48	7315	Natarajan 55/M	Pain, swelling, crepitus, joint tenderness	48	B.T	9,400	57	35	5	90	12	20	12	185	0.7	-	Nil	-	Narrowing of joint space	Good
					A.T	9,300	56	35	6	105	6	15	12	180	0.7	-	Nil	-		
49	7428	Glory 47/F	Pain, swelling, joint tenderness	48	B.T	10,800	63	30	7	93	12	22	11	176	-	-	Nil	-	Narrowing of joint space	Good
					A.T	10,700	58	37	5	85	5	12	11	175	-	-	Nil	-		
50	6351	Malarkodi 39/F	Pain, swelling, joint tenderness	48	B.T	9,400	52	44	4	87	4	12	11	177	0.9	-	Nil	-	Soft tissue swelling	Good
					A.T	9,500	58	37	5	90	4	10	12	165	0.9	-	Nil	-		

BT – Before treatment, AT – After treatment

SI. NO	OP NO	NAME AGE/SEX	SIGNS & SYMPTOMS	NO OF DAYS	B.T & A.T	INVESTIGATION												RESULTS
						BLOOD								SERUM	URINE			
						TC CELLS/ CU MM	DC %			ESR in mm		Hb	Urea	CL	Alb	Sug.	Dep.	
							P	L	E	½ HR	1 HR							
1	6014	Nirmala 50/F	polyuria, polydipsia polyphagia fatigue	48	B.T	9,800	61	37	6	5	12	10	29	162	-	+	-	polyuria, polydipsia fatigue relieved
					A.T	9,800	60	36	4	6	15	10	28	165	-	-	-	
2	6013	Padmavathi 35/ F	Polyuria Polydipsia Polyphagia Fatigue	50	B.T	9,600	58	38	4	6	20	11	23	186	-	+	-	Polyuria, Polydipsia Polyphagia relieved
					A.T	9,700	56	39	5	5	18	10	22	175	-	-	-	
3	6368	Elven Rani 57/F	Polyuria Polydipsia Polyphagia Fatigue Peripheral Neuritis	48	B.T	9,800	58	36	6	11	20	10	25	168	-	++	-	Polyuria, Polydipsia, Polyphagia Relieved
					A.T	9,600	58	38	4	15	22	12	22	165	-	-	-	
4	1766	Ganesh 55/M	Polyuria, Polydipsia Polyphagia Fatigue	48	B.T	10,200	58	38	4	5	15	12	28	178	-	++	-	Polyuria, Polydipsia, Fatigue Relieved
					A.T	10,200	61	35	4	4	12	12	25	186	-	+	-	
5	2088	Kousalya 46/F	Polyuria, Polydipsia Fatigue	50	B.T	9,800	61	34	5	12	22	10	20	172	-	++	-	Polyuria, Fatigue Relieved
					A.T	9,800	58	38	4	5	5	10	22	165	-	-	-	

SI. NO	OP NO	NAME AGE/SEX	SIGNS & SYMPTOMS	NO OF DAYS	B.T & A.T	INVESTIGATION												RESULTS
						BLOOD								SERUM	URINE			
						TC CELLS/ CU MM	DC %			ESR in mm		Hb	Urea	CL	Alb	Sug.	Dep.	
							P	L	E	½ HR	1 HR							
6	2987	Gayathri devi 52/F	polyuria, polydipsia polyphagia fatigue	48	B.T	9,200	58	37	4	7	18	10	26	172	-	+	-	polyuria, polydipsia, fatigue relieved
					A.T	9,400	60	61	4	5	12	10	25	170	-	-	-	
7	3783	Ashok Kumar 42/M	Polyuria Polydipsia Polyphagia Fatigue	50	B.T	10,200	57	37	6	6	18	13	24	161	-	+	-	Polyuria, Polydipsia, Polyphagia relieved
					A.T	10,200	58	36	6	11	20	12	25	165	-	-	-	
8	4767	Titis 45/M	Polyuria Polydipsia Peripheral Neuritis	48	B.T	10,600	58	39	5	12	25	12	27	159	-	++	-	Polyuria, Polydipsia, Polyphagia Relieved
					A.T	10,200	57	37	6	8	20	12	25	160	-	-	-	
9	4693	Jayamani 49/F	Polyuria, Polydipsia Polyhagia Fatigue	48	B.T	9,800	61	37	6	4	12	11	23	169	-	++	-	Polyuria, Polydipsia, Fatigue Relieved
					A.T	9,800	60	36	4	5	15	11	20	165	-	+	-	
10	4621	Lingam 48/ M	Polyuria, Polydipsia Fatigue	50	B.T	10,100	58	38	4	11	20	13	23	171	-	++	-	Polyuria, Fatigue Relieved
					A.T	10,200	56	39	5	15	22	13	25	168	-	-	-	

SI. NO	OP NO	NAME AGE/SEX	SIGNS & SYMPTOMS	NO OF DAYS	B.T & A.T	INVESTIGATION												RESULTS
						BLOOD								SERUM	URINE			
						TC CELLS/ CU MM	DC %			ESR in mm		Hb	Urea	CL	Alb	Sug.	Dep.	
							P	L	E	½ HR	1 HR							
11	3726	Senthil Kumar 58/M	polyuria, polydipsia polyphagia fatigue	50	B.T	10,200	58	38	4	12	22	12	23	173	-	+	-	polyuria, polydipsia, fatigue relieved
					A.T	10,200	61	35	4	5	12	12	22	169	-	-	-	
12	4770	Subathra 53/F	Polyuria Polydipsia	48	B.T	9,800	57	37	6	20	40	11	26	169	-	+	-	Polydipsia Relieved
					A.T	9,700	58	36	6	12	35	12	25	158	-	-	-	
13	5930	Anandan 53/M	Polyuria Polydipsia Peripheral Fatigue	48	B.T	10,400	58	38	4	5	12	12	26	169	-	++	-	Polyuria, Polydipsia, Polyphagia Relieved
					A.T	10,200	56	37	5	6	15	12	28	170	-	-	-	
14	8961	Perumal 55/M	Polyuria, Polydipsia Fatigue Peripheral neuritis	48	B.T	10,200	61	37	6	12	20	13	23	159	-	+	-	Polydipsia, Fatigue, Peripheral neuritis Relieved
					A.T	10,200	60	36	4	14	20	13	22	155	-	-	-	
15	9011	Nalini 46/F	Polyuria, Polydipsia Fatigue	48	B.T	9,800	58	38	4	5	15	10	22	162	-	-	-	Polyuria, Polydipsia, Fatigue Relieved
					A.T	9,800	61	35	4	7	21	11	23	160	-	-	-	

SI. NO	OP NO	NAME AGE/SEX	SIGNS & SYMPTOMS	NO OF DAYS	B.T & A.T	INVESTIGATION												RESULTS
						BLOOD								SERUM	URINE			
						TC CELLS/ CU MM	DC %			ESR in mm		Hb	Urea	CL	Alb	Sug.	Dep.	
							P	L	E	½ HR	1 HR							
16	9345	Jaya Raman 70/M	polyuria, polydipsia polyphagia fatigue	48	B.T	10,600	56	39	5	12	20	12	29	185	-	++	-	polydipsia, Polyphagia, fatigue relieved
					A.T	10,200	57	37	6	8	15	12	25	180	-	-	-	
17	9902	Jagannathn 60/M	Polyuria Polydipsia Fatigue	50	B.T	10,400	61	35	4	7	18	12	28	211	-	-	-	Polydipsia, Fatigue Relieved
					A.T	10,400	58	38	4	5	15	13	26	195	-	-	-	
18	2615	Vijaya lakshmi 50/F	Polyuria Polydipsia Polyphagia	48	B.T	9,800	61	37	6	14	25	11	26	187	-	+++	-	Polyuria, Polyphagia Relieved
					A.T	9,800	60	36	4	5	20	12	25	172	-	-	-	
19	1489	Bhagrat 65/M	Polyuria, Polydipsia Fatigue Peripheral neuritis	48	B.T	10,200	58	38	4	12	20	12	27	210	-	+	-	Polydipsia, Fatigue Peripheral neuritis Relieved
					A.T	10,100	61	35	4	5	12	13	26	187	-	-	-	
20	2850	Suseela 69/F	Polyuria, Polydipsia, Polyphagia Fatigue	48	B.T	9,600	60	36	4	15	34	10	28	185	-	-	-	Polyphagia, Polydipsia, Fatigue Relieved
					A.T	9,600	58	37	5	8	20	11	25	180	-	-	-	

SI. NO	OP NO	NAME AGE/SEX	SIGNS & SYMPTOMS	NO OF DAYS	B.T & A.T	INVESTIGATION												RESULTS
						BLOOD								SERUM	URINE			
						TC CELLS/ CU MM	DC %			ESR in mm		Hb	Urea	CL	Alb	Sug.	Dep.	
							P	L	E	½ HR	1 HR							
21	2804	Kasthuri 55/F	polyuria, polydipsia polyphagia Fatigue	48	B.T	9,800	58	38	4	12	20	11	29	182	-	++	-	Polyuria, polydipsia, Polyphagia, relieved
					A.T	9,800	56	37	7	6	15	11	26	172	-	-	-	
22	2494	Karunanidhi 55/M	Polyuria, Polydipsia, Polyphagia Fatigue	48	B.T	10,200	57	37	6	8	15	13	28	188	-	+++	-	Polyuria, Polyphagia, Fatigue Relieved
					A.T	10,100	58	36	6	5	12	13	25	165	-	-	-	
23	9974	Ellama 45/F	Polyuria Polyphagia Fatigue Peripheral neuritis	50	B.T	9,800	58	38	4	12	20	12	26	182	-	++	-	Polyuria, Polyphagia, Peripheral neuritis Relieved
					A.T	9,600	61	35	4	5	12	11	22	175	-	-	-	
24	5039	Indra 64/F	Polyuria, Polydipsia Fatigue	48	B.T	9,400	61	37	6	6	15	11	23	159	-	+	-	Polyuria, Fatigue Relieved
					A.T	9,400	60	36	4	5	15	12	20	160	-	-	-	
25	5220	Adikesavan 60/M	Polyuria, Polydipsia, Fatigue	48	B.T	10,200	60	37	3	8	22	12	26	172	-	++	-	Polyuria, Fatigue Relieved
					A.T	10,000	58	38	4	10	26	12	26	170	-	-	-	

SI. NO	OP NO	NAME AGE/SEX	SIGNS & SYMPTOMS	NO OF DAYS	B.T & A.T	INVESTIGATION												RESULTS
						BLOOD								SERUM	URINE			
						TC CELLS/ CU MM	DC %			ESR in mm		Hb	Urea	CL	Alb	Sug.	Dep.	
							P	L	E	½ HR	1 HR							
26	5848	Padma 48/F	polyuria, polyphagia Fatigue	48	B.T	9,800	57	37	6	5	15	10	23	178	-	-	-	Polyuria, Polyphagia, Fatigue relieved
					A.T	9,800	58	35	7	6	20	10	22	165	-	-	-	
27	4792	Martin 49/M	Polyuria, Polydipsia, Polyphagia Fatigue	48	B.T	10,200	58	38	4	12	22	12	26	186	-	++	-	Polyuria, Polydipsia polyphagia Relieved
					A.T	10,100	60	35	5	8	15	12	25	185	-	-	-	
28	5989	Balaji 53/M	Polyuria polydipsia Polyphagia Fatigue	48	B.T	10,200	60	36	4	7	15	13	23	171	-	-	-	Polyuria, Polydipsia, Polyphagia, Peripheral Relieved
					A.T	10,200	59	36	5	6	18	12	23	175	-	-	-	
29	6031	Sekar 55/M	Polyuria, Polydipsia Fatigue Peripheral neuritis	48	B.T	10,400	61	37	6	12	22	12	25	185	-	+	-	Polyuria, Peripheral Fatigue Relieved
					A.T	10,200	60	36	4	6	15	13	24	183	-	-	-	
30	6300	Gnammal 60/F	Polyuria, Polydipsia, Polyphagia Fatigue	50	B.T	9,600	58	38	4	20	40	10	28	193	-	+	-	Polyuria, Fatigue Relieved
					A.T	9,600	56	39	5	12	22	11	26	182	-	-	-	

SI. NO	OP NO	NAME AGE/SEX	SIGNS & SYMPTOMS	NO OF DAYS	B.T & A.T	INVESTIGATION												RESULTS
						BLOOD								SERUM	URINE			
						TC CELLS/ CU MM	DC %			ESR in mm		Hb	Urea	CL	Alb	Sug.	Dep.	
							P	L	E	½ HR	1 HR							
31	6791	Ragunathan 56/M	polyuria, Polydipsia polyphagia Fatigue	48	B.T	10,200	58	36	6	5	14	12	26	161	-	-	-	Polyuria, Polyphagia, Polydipsia relieved
					A.T	10,200	57	38	5	4	15	12	25	160	-	-	-	
32	7344	Krishan 60/M	Polyuria, Polyphagia Fatigue Peripheral Neuritis	48	B.T	10,400	61	37	6	12	20	13	28	195	-	-	-	Polyuria, Polydipsia Fatigue Relieved
					A.T	10,300	60	36	4	10	32	13	26	190	-	-	-	
33	7854	Kalaiselvi 52/F	Polyuria polydipsia Fatigue	48	B.T	9,800	61	35	4	5	12	10	24	173	-	+	-	Polyuria, Fatigue Relieved
					A.T	9,800	58	36	6	7	15	11	24	165	-	-	-	
34	7855	Sudha 55/F	Polyuria, Polydipsia Polyphagia Fatigue	50	B.T	9,200	61	34	5	12	20	10	23	175	-	++	-	Polyuria, Polydipsia, Fatigue Relieved
					A.T	9,400	56	39	5	5	15	10	22	168	-	-	-	
35	8433	Lakshmi 53/F	Polyuria, Polydipsia, Polyphagia Fatigue	48	B.T	9,600	59	35	6	20	32	11	23	165	-	++	-	Polydipsia, Polyphagia, Fatigue Relieved
					A.T	9,400	58	37	6	5	15	11	23	160	-	-	-	

SI. NO	OP NO	NAME AGE/SEX	SIGNS & SYMPTOMS	NO OF DAYS	B.T & A.T	INVESTIGATION												RESULTS
						BLOOD								SERUM	URINE			
						TC CELLS/ CU MM	DC %			ESR in mm		Hb	Urea	CL	Alb	Sug.	Dep.	
							P	L	E	½ HR	1 HR							
36	8516	Vennila 45/ F	polyuria, Polydipsia polyphagia Fatigue	48	B.T	9,600	57	39	4	6	20	11	24	185	-	+	-	Polyuria, Polydipsia Fatigue relieved
					A.T	9,600	58	38	4	5	12	11	22	178	-	-	-	
37	9142	Sridhar 53/M	Polyuria, Polydipsia Polyphagia Fatigue	48	B.T	10,000	61	34	5	12	20	12	28	211	-	-	-	Polyuria, Polydipsia Fatigue Relieved
					A.T	10,200	58	38	4	8	15	12	25	195	-	-	-	
38	9723	Saraswathi 46/M	Polyuria polydipsia Fatigue	48	B.T	9,800	56	39	5	12	22	10	26	174	-	+	-	Polyuria, Polyphagia Relieved
					A.T	9,800	58	38	4	12	20	10	25	170	-	-	-	
39	414	Rajendran 57/M	Polyuria, Polydipsia Fatigue Peripheral Neuritis	48	B.T	10,200	56	38	6	14	24	11	25	170	-	-	-	Polyuria, Fatigue Relieved
					A.T	10,200	58	36	6	8	15	12	28	209	-	-	-	
40	404	Gowri 48/F	Polyuria, Polydipsia, Polyphagia Fatigue	48	B.T	9,600	57	38	5	12	12	20	10	183	-	-	-	Polydipsia, Polyuria Fatigue Relieved
					A.T	9,400	58	37	5	5	5	12	11	180	-	-	-	